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Radio Interference from Telephone Equipment

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CAUSES OF INTERFERENCE in telephone plant with radio reception and how interference is produced. Equipment for preventing or eliminating disturbance with radio reception by telephone plant is in service and giving commercial satisfaction. Part I of paper presented before the Western Society of Engineers

SINCE January of 1929, the writer has been giving considerable attention to interference which telephone equipment was causing in broadcast radio receivers. Out of the investigations carried on by him and his associates have come facts and relationships which it is hoped may be of interest and profit to others.

For a number of years before the above date, there had been a certain amount of field work carried on, in the attempt to remedy specific complaints. Some of the remedies were permanent. Too many of them gave relief at the time, only to reappear as fresh complaints one, two, or three years later. It was realized that the matter deserved thorough investigation as to basic principles, in order that future remedies might be as permanent as commercially possible.

Preliminary Survey of Radio Interference

The preliminary survey of the field revealed that all telephone apparatus *can* cause radio interference. While listening to the demonstration of a new radio receiver, suddenly there occurred several unmusical thumps and cracks in the loudspeaker. They came from the private branch exchange in the same building.

The salesman said this was of frequent occurrence, but was not a fault in the radio set. Every time the operator plugged up a connection, rang on a line, or pulled down a connection, tiny sparks were produced, and these caused the interference.

Automatic telephone switchboards, having many more relays and other contacts than manual boards, produce more interference. The busy tone, the dial tone, the ringing interrupter, the ringing converter—all depend for their operation on relays which switch direct current, and are clearly heard in any commercial radio set which has an antenna near enough to the apparatus or its connecting wires. The calling device which is on each automatic telephone, though handling relatively small current, causes clicks in nearby radio sets.

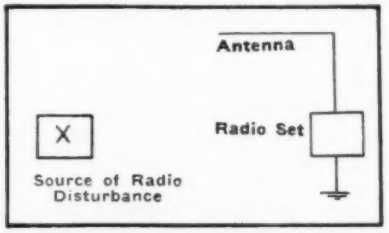

Fig. 1. Condition when radio receiver is quiet.

Field investigations revealed great irregularity of complaint. A certain piece of equipment caused complaint here, but no complaint there. This is accounted for by difference of exposure, of radio sets, and of human nature. Radio sets which are not near telephone plants or wires, will not hear such radiation as exists. There are some small exchanges which have no nearby radio installations although such a situation is disappearing. Radio sets differ very materially in their sensitivity.

A certain receiver was considered the best on the market at the given time. Yet a few years later, a set was on the market with a sensitivity many times as great as the former. It detected radio interference which the former set could not reveal.

Some people are very quick to complain about any disturbance in their

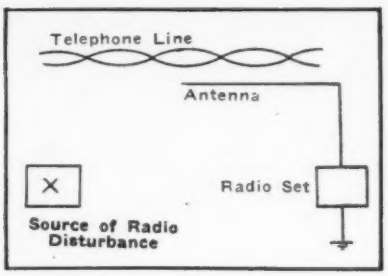

Fig. 2. When telephone line overlaps antenna and motor, radio receiving trouble starts.

radio sets. Others accept it as a matter of course, as if it were a necessary evil. They listen to the desired program, and pay no attention to the noise. Hence it occurs that the same telephonic equipment will give perfect satisfaction in one place—no radio complaints—while another installation will give rise to energetic complaints.

The size of the community has much to do with the nature of the complaints. In a large city, there is complaint of hearing the interrupters, tones, etc., in a small region close to the central office. Away from the office such complaints are not made, but in their place people mention the dialing of their neighbors. Apparently their own dialing causes no objection.

In rural regions, the small villages and towns, radio listeners hear everything that goes on in the telephone exchange. It is heard all over town.

The chief causes for this difference between city and rural telephone exchanges are: Much telephone cable in the city and often none of it in the small town. Powerful broadcasting stations near the city, so that many radio receivers are regularly operated at low amplification. Moderate to large distances from the small town to the broadcasting centers so that most of the sets are operated at high amplification.

At one such small town I counted 35 places on the dial, each of which furnished a good strong program—with the volume control at nearly full value. Under this condition the radio set will indicate rather loudly any interference caused by nearby apparatus of any kind—vacuum cleaners, vibrating rectifiers to charge batteries, as well as telephone equipment.

In the city, the telephone cable, with its capacitance from each wire to earth, dissipates the central office radiation, leaving the dial on the telephone as the only disturber in most of the region.

The Cause of Radio Interference

It is the electrical contact, made and broken, which causes radio interference from most apparatus. Poorly-fitting brushes on the slip rings or commutator of a motor or generator will give rise to trouble in the radio set. A dying incandescent lamp has been known to cause much noise until located or until it finally burned out.

Every relay in a telephone exchange makes and breaks current, so that each is a potential source of interference.

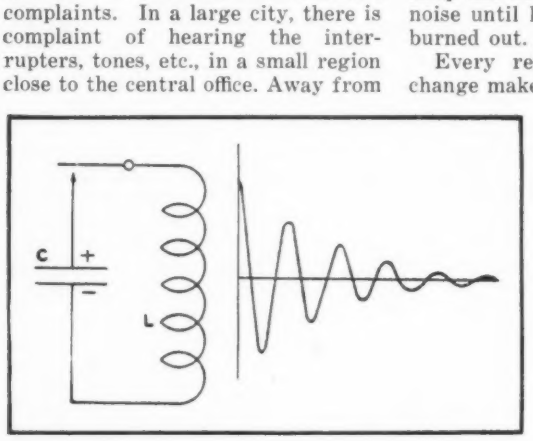

Fig. 3. Oscillatory discharge from condenser and inductive coil causes a group of decaying oscillations.

Propagation of Radio Disturbance

Radio disturbance caused by the making or breaking of a contact is carried chiefly by wires which lead away from the central office. Open-wire lines are the worst, for they have not much capacitance to earth and have been known to carry radio disturbance for miles across the country. Such a line acts like the antenna of a broadcasting station, not only carrying the radio current away from the source, but also radiating it out into all the space around wires all along the way.

Telephone cable is not such a good carrier. One mile of cable wire, whose capacitance to earth may be 0.05 mf. presents only 5.9 ohms to 540 kilocycles; and if the frequency be 1080 kilocycles, it drops to 2.95 ohms. Thus it rapidly attenuates the disturbance. An all-cable telephone plant carries very little of the disturbance away from the central office. As observed, there is a little complaint near the office.

Wires which are classed as leading *into* the central office are just as bad distributors as those which are classed as leading *out* of it. The electric power wires, which carry electricity *into* the office, also carry radio disturbance *out* of it. This is particularly true if the power lines are overhead.

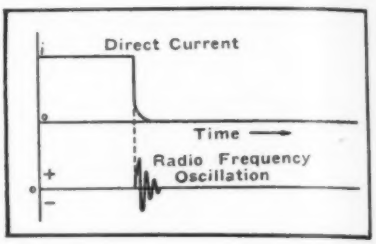

Fig. 4. Sudden break of direct current produces a short, heavily-damped radio frequency oscillation.

The telephone line may incidentally become the means of propagating radio interference. Consider the case of a radio receiver with a properly-installed antenna. Perhaps a block or two away is an electric motor or some other device which can create disturbance, Fig. 1. But because there are no wires between it and the radio set, the latter enjoys peace and quiet—of a kind.

Some day a telephone line is strung along the street or alley, Fig 2, overlapping the motor and the radio antenna. Immediately the radio set emits loud information every time the motor is operated. The telephone line is the connecting link—the later comer. But no lawyer has to my knowledge ever claimed that the telephone company is to blame and must abate the nuisance. The

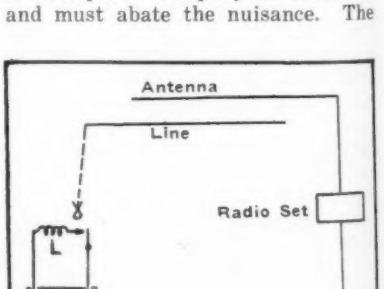

Fig. 5. Contact-maker radiation situation existing between many electrical interrupters and radio receiving sets.

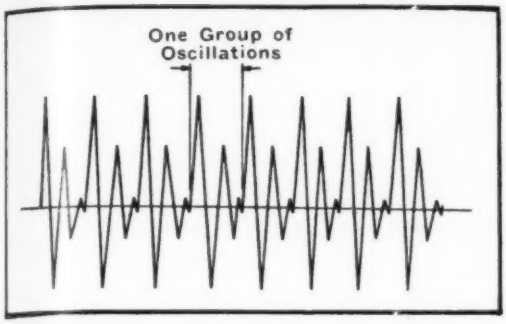

Fig. 6. Radio waves produced by buzzer. Each single group of decaying oscillations is due to one opening of the buzzer contact.

responsibility rests squarely upon the owner of the offending motor.

Radio Interference Waves— Their Nature and Effect

A purely unmodulated continuous radio wave causes no interference in general. Such a wave, on passing through the detector of a radio receiver, produces only the effect of direct current, which makes no sound in the loudspeaker. If in rare cases the unmodulated wave is near in frequency to some other radio wave, there may be formed a beat note between the two.

An oscillatory discharge from a condenser into an inductive coil, Fig. 3, causes one group of decaying oscillations. Such a radio wave will cause one "click" or "thump" in a radio set. The sound will depend very much on the character of the audible frequency amplifier and of the loudspeaker.

When direct current is suddenly broken, Fig. 4, it produces a short, heavily-damped radio frequency oscillation. Though not shown in the illustration, this gives evidence of containing many frequencies, which the discharge of a condenser into a low resistance inductive coil should not have. The effects of one single break of direct current are measurable all over the broadcast band, and far up into the higher radio frequencies.

The situation existing between many electrical interrupters and radio sets is illustrated by Fig. 5. Let L be any commercial electromagnet or relay, operated by battery E through any kind of contact. The radio set and its antenna are at some distance away. As long as there is no connected line, the buzzing of the contact will not be heard in the radio set. But when the line is connected, immediately the disturbance travels out and by means of the coupling between line and antenna causes noise in the loudspeaker.

A contact which is continuously made and broken, as in any of the many interrupters which are in use, will cause a train of decaying oscillations, Fig. 6. Each single group of oscillations is due to one *opening* of the contact. As a rule, the *closing* has not as much effect, but there are cases in which closing causes more effect. The number of groups of oscillations corresponds to the speed of the interrupter in cycles per second.

Actual waves are not as uniform as shown in Fig. 6, for the contact is very unconstant. But in general, an interrupter produces in the radio receiver a more or less steady train of clicks which may be called a "patter." Some have been unkind enough to compare it to machine gunfire. If it be related to a modulated continuous radio wave, the nearest approach would be the 100 per cent modulated wave, Fig. 7. But, in reality, the wave from the interrupter is worse.

The term "suppression" was adopted because no other word seemed to be adequate. Radio interference cannot be eliminated, for that would be enormously expensive. Even then in the years to come people may make radio receivers which can detect far smaller waves than commercial radio sets do today.

Moreover, the telephone is not the only offender. Other electrical apparatus causes just as much trouble. Surveys have been made which reveal that out of all complaints made, only a small fraction of them are due to telephone equipment.

Suppression of Radio Interference

From time to time we have been asked for some device or arrangement which could be applied to the radio set or its installation to avoid the necessity for treating the apparatus which causes the interference. This raises the question: Who shall suppress the interference; the radio people or the makers of the disturbing apparatus (telephones, refrigerators, etc.)? A short study of the conditions will show why the latter are caring for their apparatus.

Commercial radio interference consists of radio frequencies that are in the band of frequencies which the receiver must use. Anything done to the set to prevent it from responding to those interference waves will render it useless for receiving the desired broadcast programs.

If the disturbance arrives almost wholly by way of the current supply to the radio set (Fig. 8), a radio suppressor can be interposed with very satisfactory results.

If the radio set is several stories up in the air, and the disturbance waves are chiefly in the space below

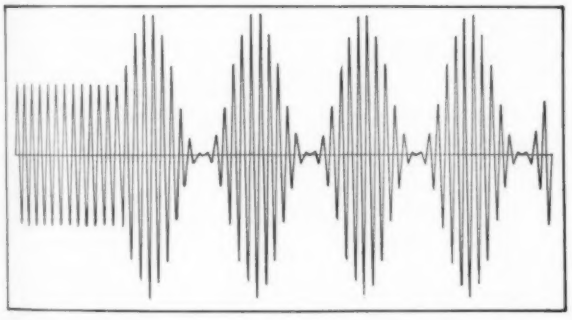

Fig. 7. Radio wave 100 per cent modulated.

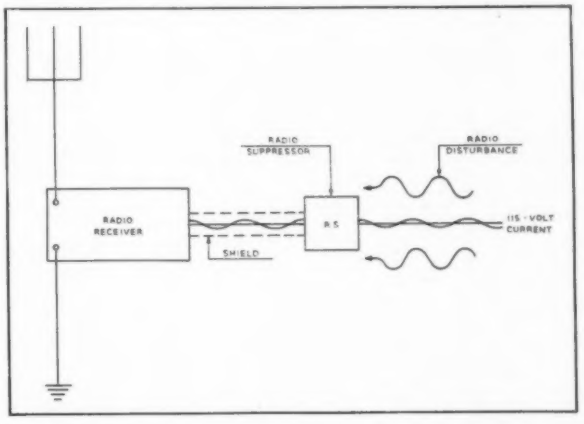

Fig. 8. Interference by way of the current supply to the radio set.

(Fig. 9), the ground wire of the set may be shielded.

If the radio receiver is on the ground floor and there is a long vertical connection to the antenna proper (Fig. 10), and the disturbing waves are chiefly in the region of the vertical lead-in wire, the latter may be shielded, and the disturbance greatly reduced.

If the radio set is well within a building, so that the horizontal part of the lead-in passes through a localized disturbance wave (Fig. 11), quiet may often be secured by installing two radio frequency transformers with a twisted pair of wires to lead the desired waves to the receiver.

But when the active part of the antenna *must be located* in the region of the disturbing waves (Fig. 12), there is no escape—the interference must be suppressed at the source. Unfortunately, most of the cases are like this.

Since the interference must be suppressed at the source, it is the maker of the apparatus who must do

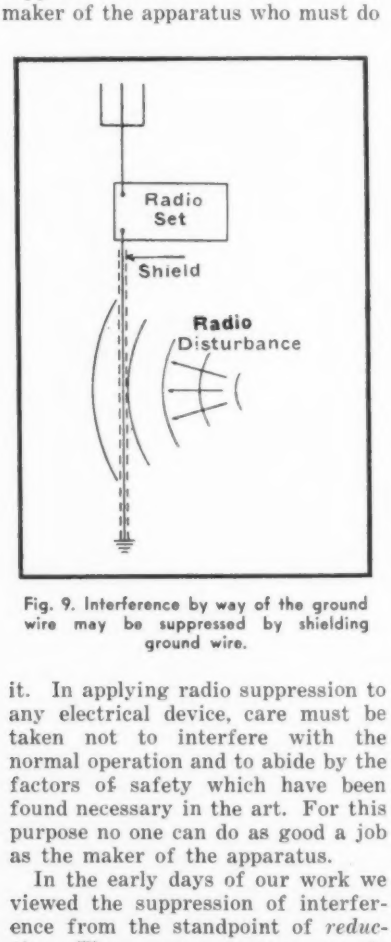

Fig. 9. Interference by way of the ground wire may be suppressed by shielding ground wire.

it. In applying radio suppression to any electrical device, care must be taken not to interfere with the normal operation and to abide by the factors of safety which have been found necessary in the art. For this purpose no one can do as good a job as the maker of the apparatus.

In the early days of our work we viewed the suppression of interference from the standpoint of *reduction*. There were numerous cases in which we reduced the interference so that the customer was satisfied at the time. The comparison which we gave, without the suppressors and with them, was impressive. The user of the apparatus freely acknowledged that the noise was very much less; sometimes it could scarcely be heard, perhaps not heard at all in the midst of a reasonably good program.

He expressed himself as satisfied. But later the same customer renewed his complaint of the same interference. Investigation revealed that

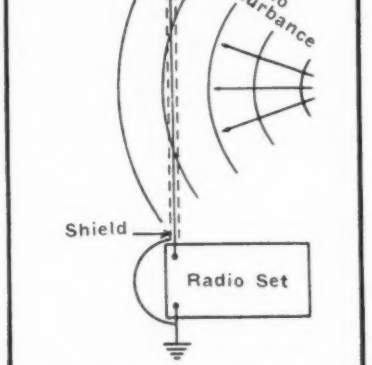

Fig. 10. Disturbance through vertical lead-in wire may be greatly reduced by shielding the wire.

the noise was no louder than it was after the suppressors had been applied; there had been no increase. The customer, however, had become accustomed to the improved condition. He heard the remaining noise; became increasingly annoyed by it, and renewed the complaint.

These facts forced us to abandon the idea of rating the improvement in decibels of reduction, but to value our achievement by the residual interference—the amount remaining after suppressors had been applied.

No matter how bad was the noise before, it is the *remaining noise* which finally counts. The time is coming when this residual must be fixed by agreement, and fixed at a practical value which will give radio users good reception without unduly penalizing the telephone industry, including telephone users.

The form of statement of this standard residual might well express that the radio frequency electromotive force between any telephone wire and ground shall not exceed a stated value, such emf. being due only to the telephone apparatus. This may be made to apply to the highest

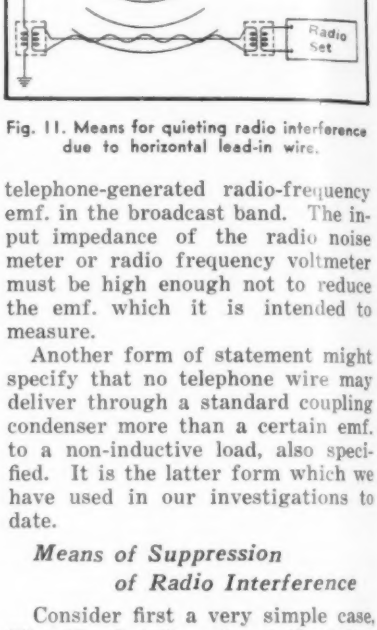

Fig. 11. Means for quieting radio interference due to horizontal lead-in wire.

telephone-generated radio-frequency emf. in the broadcast band. The input impedance of the radio noise meter or radio frequency voltmeter must be high enough not to reduce the emf. which it is intended to measure.

Another form of statement might specify that no telephone wire may deliver through a standard coupling condenser more than a certain emf. to a non-inductive load, also specified. It is the latter form which we have used in our investigations to date.

Means of Suppression of Radio Interference

Consider first a very simple case, Fig. 13. Let there be at the left a source of radio frequency current and at the right a radio-receiving device of any kind. If a wire from the source meets a wire from the receiver in two flat surfaces, A and C, there will be a capacitative link between them, and the radio current will pass very easily to the receiver.

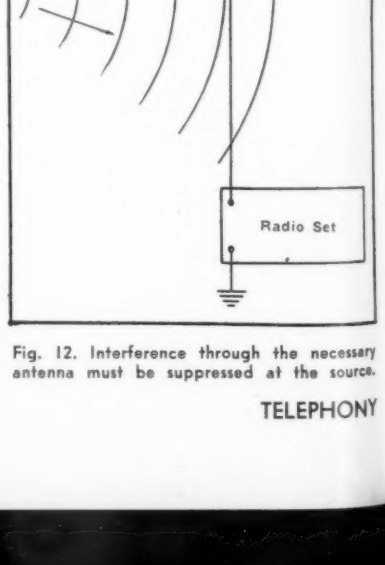

Fig. 12. Interference through the necessary antenna must be suppressed at the source.

Now interpose between plates A and C another plate, B, which is perhaps a bit larger than either A or C, and connect B to earth. Under simple conditions, plate B acts as a short-circuit, providing such a low impedance path to earth that none of the radio frequency current gets to the receiver. This is a simple illustration of a shield. It is more effective if plate B be extended so as partly to surround plate A.

Suppose that we consider further

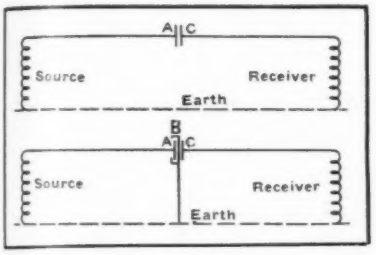

Fig. 13. Simple illustration of a shield.

the case of a self-interrupting buzzer, Fig. 14. Let it be completely surrounded by a metal shield, including the battery. Even though there is a hole in the shield, no disturbance will get out. In fact, the shield may be made of copper wire cloth having a mesh as large as 6 to 10 mm. without failing to shield completely.

But let us connect a line wire (broken line in Fig. 14) to the interrupter and lead it out through the hole—immediately radiation begins, and often very strongly. Wires we must have. We cannot keep telephone devices in metal boxes without wires.

To permit wires to carry telephone current all over town and yet prevent the radio frequency from escaping, various combinations of radio-frequency choke coils and condensers are used.

To refresh our minds on their properties, we remind ourselves that

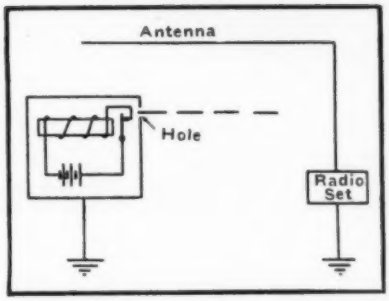

Fig. 14. Shield and line wire condition which produces interference.

the reactance of an inductive coil increases with frequency, while that of a condenser decreases. Moreover, these two reactances are opposite in sign, so that if put in series with each other there is partial or entire cancellation. There is complete neutralization at only one frequency. Above that the coil tends to predominate, below the condenser predominates. *(To be concluded)*

The Operators' Corner

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

THE WORLD will move ten times as fast between now and 1950 as it did between 1910 and now. Are you ready?

There is no denying we are living in a streamlined age—an era of speed where time is measured in minutes and seconds. Locomotives, automobiles, airplanes and machinery of all kinds are geared to operate at great speed.

The telephone industry is not immune to the trend of the times. Therefore, new operating practices for handling local and long distance calls must be devised and established practices must be revised, from time to time, in order that telephone service will keep pace with this streamlined era.

Telephone companies must be constantly alert in anticipating their future requirements, both equipment and force, in order to be prepared to render adequate and satisfactory telephone service.

The art of handling telephone calls has become an intricate business requiring trained, competent people. Speedy, accurate and efficient service can only be rendered if all of the rules of the game are followed.

"That is just a little thing," some chief operator may remark. "I can't see that it will make any difference in the service." A little thing, perhaps, but a combination of little things, all performed according to instruction, results in telephone service that is pleasing and satisfactory to telephone customers. Service that will keep them in a happy frame of mind, so that using the telephone is a pleasure and not an annoyance.

MODERN operating methods must be adopted to keep pace with progress. Series No. 338

Every chief operator working in a central office today must be keenly alert, both in making her selection for additions or replacements on her operating force, and in her training methods. She must seek the best material her locality has to offer and employ modern training methods if she desires to be ready to render telephone service in a world that will be moving 10 times as fast in the next 20 years as it did in the past 25 years. She must also apply all the modern operating methods for rendering telephone service available at the present time as well as those which will be devised in the future. Then, and only then will she be able to say "Yes" in answer to the query "Are you ready?"

Questions from Illinois Operators

1. On a collect call to a pay station, the night rate is in effect at the called station and the day rate is in effect at the originating point. Which rate would apply?
2. On a collect station-to-station call, the called station says there is no one there to accept the charge now but that there will be in about half an hour. The calling party asks to have the call tried again at that time. Should the same ticket be used?
3. On a paid station-to-station grain call, the called station answers and the calling party finds there is no one there who can take the market and he asks to have the call tried later. Should it be made person-to-person and the same ticket used, or should a new ticket be written?
4. Is there a limit for a non-subscriber to hold a business line?
5. If a toll call has to be repeated by an operator, upon what do you base the number of minutes to be charged on the call?

The answers to these traffic questions are given on page 29.

In the Nation's Capital

By FRANCIS X. WELCH

Special Washington, D. C., Correspondent for TELEPHONY

WHAT THE CONGRESSIONAL committee plans to do in its study of monopolies in the United States. . . . Committee recognizes that all monopolies are not necessarily bad. . . . Once competition is destroyed by monopolistic practices in a given field it is very difficult, if not impossible, to restore it. . . . Telephone industry furnishes possibly only model of restrained conflict between monopoly and competition by a compact (Kingsbury commitment) which delimits operating borders

HAVE YOU ever studied a topographical map of the United States—one of those dried mud-pie pictures which give a three-dimensional illusion of mountains and valleys and watersheds?

It is interesting to see how the water drainage system of this great continent of ours (and all other continents, for that matter) rises in the headlands and ridges in the form of tiny creeks and branches—and flows through a series of twisting, turning, and ever-growing tributaries until it enters the arteries of our major rivers, finally joining the ocean at some bay, gulf, or other point of sea-level discharge.

And we all recall, of course, from our school books that the mystic physical cycle of life-giving water supply is completed when the ocean water rises again under the spell of the sunshine, to form rain and snow-bearing clouds which drift back over the highlands to renew the sources from whence they sprang.

WELL, the joint committee which the last Congress created to study monopolies in the United States has the job of reconstructing just such a visual three-dimensional map of the commerce of the United States. This job has never been done very well before, and it is quite likely that the committee won't make a perfect success. It may fail completely; but that is the task it has set for itself.

The foregoing analogy between the drainage system of geographical America and the ebb and flow of its commercial life is pretty neat when you consider it closely. The principal differences are that our watershed systems are physical and relatively constant, while our streams of commerce are intangible and ever-shifting like the erratic rivers of the Chinese plains.

To make this last thought a little clearer, you will see on your topographical relief map that the United States is divided into a few major watersheds, separated by mountain ranges. There is the Great Divide of western cowboy fame—a high backbone of the Rockies which parts the waters that flow into the Pacific from those which fall on the eastern slopes and join the central or Mississippi valley and flow down to the Gulf.

Then in the eastern half there is a series of smaller basins which drain into the Great Lakes, the Chesapeake Bay, and along the Atlantic seaboard generally. These divisions are as permanent as things can be permanent in this world of change.

The Great Continental Divide is just about where it was a hundred, a thousand, or a hundred thousand years ago. And there is an actual point in north-central Pennsylvania where a cup of water poured over the peak would split into three parts—one going north to the St. Lawrence, another east to the Chesapeake Bay and a third going down to the Gulf via the Allegheny and Ohio and Mississippi Rivers.

These physical divisions are relatively stable. Not so the economic watersheds which correspond to our great industries. We have, for example, a certain part of our commercial life draining through our great steel industry. Agriculture and all of its incidents (such as implement manufacture, canning, and so forth) might justly be compared to the great Mississippi basin of our economic map of the United States because so many people depend on it for a living.

And, of course, you can easily imagine the railroads and utilities as forming another major watershed of our stream of interstate commerce. Then there are chemicals and mining and the other great divisions of business with their multiple subdivisions, draining like so many twisting tributaries into the central flow.

JUST as one section of our country can flourish under multiple rains while streams in another section may languish under a drouth, so also in our economic life one industry can prosper whilst another withers. More than that, our industries have a tendency to shift and overrun established economic basins and watersheds.

When that happens economic supplies are drained away from former tributaries and deposited into the new and larger invading arteries of commerce. Such is the trend of monopoly which seeks always to expand and to overrun independent financial drainage systems.

Now the job of the joint investigating committee (which has been dubbed here in Washington by the unfortunate misnomer, "anti-monopoly investigation") is to chart these various economic watersheds so as to determine which industrial basins should be confined, which encouraged to spread, and which left alone.

In other words, the committee recognizes that all monopolies are not necessarily bad monopolies. But we know that some are; and that they have a tendency to distort the distribution of our economic drainages so as to leave whole areas of human employment and capital investment high, dry, and stranded.

LAST WEEK your correspondent heard an interesting discussion of this program for the anti-monopoly committee by one of its members, Thurman Arnold, assistant attorney general in charge of anti-trust litigation. The remarks of Mr. Arnold, who spoke at an informal luncheon of Washington newspaper reporters, editors, and publishers, were "off the record," as the journalists say; but in view of his statements in the past, it would be no violation of confidence to say that Mr. Arnold does not regard all big business as bad *per se*.

Now this is important to keep in mind because Mr. Arnold is one of those members appointed to the anti-monopoly committee by the Administration, and so he probably reflects, in a general way at least, the New Deal attitude.

Bringing this question home to our own telephone industry, there is the American Telephone & Telegraph Co. It is the biggest corporation in the world from the standpoint of the number of stockholders and the value of assets it controls. Is A. T. & T. too big to be useful? Shall its economic stream be broken up by government action and diverted into smaller channels? Mr. Arnold didn't say anything about this, but the Bell is unquestionably a good case in point.

To summarize the New Deal view on monopoly, it may be safely stated in general terms that it is recognized that some so-called monopolies are necessary in public interest. But where this is true, strict government regulation will be necessary. In other industrial situations, competition will be regarded as more desirable. In these cases, the government will move to insure the preservation of competitive streams of commerce by throwing up the barriers which can be created by Sherman anti-trust suits.

In still a third class, most troublesome of all, the federal government doesn't know whether continued competition is good or bad. And that is the main job of the joint committee. It is so important that it may possibly be necessary for a permanent policy-making body to take over the responsibility on a full-time basis.

WHAT complicates this problem of deciding what is best for the economic life streams of the country as a whole, is the fact, stressed by Mr. Arnold, that once competition has been destroyed by monopolistic practices in a given business field, it is very difficult, if not impossible, to restore it.

The situation is just like a winding river, which formerly irrigated a large stretch of territory in its course, being turned into a new bed —a short cut to the mother stream. Because of the physical fact that water seeks the most direct route to the lowest level, any engineer can tell you that it's a pretty hard job to turn the river back into its old meandering bed under such circumstances. It is more likely that the life along the old course will just have to wither up and die.

But when we are dealing with human lives—not mere water supply—when we approach the economic principles of monopoly and competition, our government cannot stand aside and let business life dry up and die out simply because business had found a financial short-cut. At least the present federal government conceives that it is its duty to see if something cannot be done under such circumstances to alleviate the transitional stage if not prevent the change altogether.

And there is the matter of preserving the purchasing power of the masses, which may roughly be compared with the rain-catching stage of our physical cycle of water supply. We know that unless industry takes care of people through jobs and wages, people won't be able to take care of industry through mass buying. And just as withering vegetation of a stranded drainage basin can no longer catch and hold the rains which feed the rivers, so economically-strangled groups of people, which formerly lived on independent enterprise, are no longer able to contribute through their purchases to the central streams of commerce.

THE JOINT committee will probably find in the American telephone business a good example of an industry which now occupies a well-defined watershed. This constancy and sharp definition was accomplished only after much conflict in the old days between the Bell and the Independents.

There doubtless are many telephone men today who seriously believe that the general situation would be better if Bell had not captured so many strongholds. But whatever the merits of such argument in theory, it is pretty much like discussing the past possibilities of dried-up river beds. Nothing can be done about it at this late date.

The telephone industry can, however, take much consolation from the fact that it is at last peacefully and profitably confined within established limits. This was largely accomplished by the old Kingsbury commitment, which, as we all know, happened under definite threat of Sherman anti-trust prosecution by the Department of Justice.

So the anti-monopoly committee will probably find in the telephone industry a model—possibly the only model—of restrained conflict between monopoly and competition in a given industry by a compact which delimits operating borders.

Now, what the committee may finally decide to do is to use this model for other industries where this problem has not been solved—where the battle is still raging as violently as it did in the old days between Bell and the Independents. In short, the prescription for some industries may be a Kingsbury commitment, or something very much like it.

It must always be kept in mind, however, that no one prescription will work in all cases. Each industry has to be judged on its own merits. Both Mr. Arnold and Senator O'Mahoney, chairman of the committee, are very emphatic about this point. And just as an example of how complicated the issue of monopoly and competition can become, consider this specific problem which turned up in Washington not long ago. (This information came to your correspondent through informal sources. Mr. Arnold had nothing to do with it.)

Seems like some lover of classical music wrote to the Justice Department complaining about the high

(*Please turn to page* 33)

Plant Men Talk Things Ov

"I Wonder Why" of a Telephone Engineer

By Ray Blain

"I Wonder Why" we in the telephone business have heard so little of the portable gasoline hammer?

We all know of the numerous advantages to be gained by the use of air-hammers; but unfortunately they are large, cumbersome and expensive and rarely available for use in the small telephone exchange. The portable gasoline hammer will do almost anything the air hammer will in the average telephone exchange and at a considerably lower cost.

Among uses for the gasoline hammer in the telephone plant is as an asphalt cutter.

The portable gasoline hammer is an air-cooled, two-cycle, single cylinder, hard-hitting gasoline-driven hammer, ruggedly-constructed, which hits approximately 1,500 blows per minute. The larger model will accommodate any standard 1⅛ inch hexagonal shank tool. This size weighs about 89 pounds.

The construction of this hammer is quite simple. It has no crankshaft, connecting rods, flywheel or bearings. It operates on low test gasoline. Lubrication is provided by mixing oil with the gasoline. The normal consumption is about one quart of this mixture per operating hour. The machine is started by turning on the ignition switch and pushing down on the starting plunger at the top of the cylinder. The free floating steel piston acts as the hammer.

In the up travel of the piston, a vacuum is created which causes a suction in the manifold. This lifts the mixture valve in the body of the carburetor and allows a charge of gasoline and air to enter the lower compression chamber.

In the down travel, the compressed gas in the compression chamber enters the combustion chamber through gas passage holes in the piston. The explosion drives the piston downward and the system continues with the operation of the hammer. Electric energy is supplied from a nine-volt dry-cell battery and coil.

The piston on its up travel compresses the gas in the combustion chamber and the piston cam operates the circuit breaker, to complete the ignition circuit which produces the spark in the spark plug for the explosion.

This tool can, in the writer's opinion, be used to advantage in any telephone exchange as an asphalt cutter, and with diamond and star drills in the drilling and cutting of stone and concrete. Frost wedges, spades, chisels and digging tools may be used as a labor-saver in the excavating of very hard or frozen ground.

A sheathing driver can be used to drive cribbing in a manhole or deep-caving trench. A tamper, when used with the gasoline hammer, will soon prove a real labor-saver when backfilling a conduit trench. The hammer may also be used in driving extra long ground rods.

We firmly believe that this tool will pay for itself in a short period of time in any telephone exchange. An investigation of its merits will most surely prove worth while.

Close-up views of the portable gasoline hammer, which is suitable for use in the plant work of telephone exchanges. It is air-cooled, hard-hitting, ruggedly constructed and easily handled, operating on low test gasoline.

▼ ▼

The Uneventful Life of a Trouble-Shooter

By Doc

While I worked for the large telephone company I was frequently called out to the connecting rural exchanges, on my own time, to clear line trouble which they were unable to locate. This was back in the "horse-and-buggy" days and they generally met me at the train with a rig. I always

This group of telephone workers comprises the construction and maintenance forces of the Pacific Telephone & Telegraph Co. at Bakersfield, Calif. The group includes four construction and two maintenance cable splicing crews, one maintenance and three line construction crews. The Bakersfield district of the Pacific Bell is situated in the southern part of the San Joaquin Valley and includes most of the towns in that section.

carried a canvas tool-bag which contained such tools as I thought would be needed on the trip.

I remember one chap who always drove a span of small mules that looked like overgrown jack rabbits; but how they could cover ground! When a line ran through exceptionally rough country, we sometimes rode horseback.

Later the old reliable Model T provided us with faster and rougher transportation. It was a crime the terrible roads over which some of these cars were driven in the early days of motor transportation.

I always made it a point to cover the entire line, clearing as many of the bad conditions as possible. When it was not convenient to correct the trouble on the spot, I instructed the trouble-shooter as to how it should be cleared later. In some instances, the trouble was attended to after I had left but in most cases it was quickly forgotten.

I remember one time I had covered a line carefully from the central office to its most distant station, clearing all the bad conditions, and still could not ring the switchboard. As a last resort my helper and I drove all the way back to the office, thinking there must be some trouble in the switchboard. In this we were right for someone had connected a low-resistance, direct-current doorbell on the line to replace the 2,500-ohm bell used to signal the operator.

Even in those days the instruments caused very little trouble. Magneto telephones have always been good from a service standpoint, although it is believed that a new design with improved appearance is long past due. The dry cell battery was generally good; to change it required very little skill on the part of the trouble-shooter, so he changed it frequently.

The principal trouble I found was due to poor ground connections, low insulation resistance and high-resistance splices in the line wire. Sleeve connectors were never used, and splices made in the iron wire with only one pair of pliers could not be expected to be very good. Trees were seldom trimmed to clear the line and they caused trouble aplenty in wet weather.

Neglect in soldering connections was perhaps the greatest detriment to good service. Then they had no solderless connectors; if they had, they surely could have put them to good use. Strange as it may seem even after all these years, the same conditions cause practically all the trouble on rural lines today.

I always enjoyed these little trips on rural line trouble, especially to a German settlement where we were always called in some farmhouse in mid-forenoon and mid-afternoon for coffee and cake. We also stopped at some farmhouse for lunch, that was really a banquet. Living as I did in those days in a boarding house, good farm meals were certainly appreciated.

The lines generally had 25 or more stations and at best the service was not good when compared to present-day standards. These people really valued their service, though, and missed it keenly when the line failed. It was always a real pleasure when I could be of assistance to them in improving or restoring service.

▼ ▼

Cable Repairs Made by Arc-Welding Method

The lead-burning or arc-welding method of making cable repairs (described by Ray Blain in TELEPHONY of April 23) was used recently to repair a 1,200-pair cable at Fort Smith, Ark. Inspection men, upon making their routine morning tests, found eight wet pairs in a maximum-sized underground cable of the Southwestern Bell Telephone Co.

Bridge measurements proved the trouble to be only two blocks from the central office in a 600-foot section of six-duct conduit, according to the story related in the Southwestern Telephone News. When the trouble was definitely located, gas was applied to the cable, to prevent additional pairs from becoming involved.

When the defective cable was uncovered, it was found that electrolysis had eaten several places in the sheath, one of which was through. After the removal of fourteen inches of defective sheath, permanent repairs were made by arc welding a 2½-inch sleeve in place of the removed sheath.

This method of repairs made it possible to fit the split tile used in repairing the conduit run snugly over the repaired cable. It will also permit the removal of this section of cable at any time it may become necessary to do so.

The testing on this repair job was done by R. T. Williams and O. D. Glassburn, toll testboardmen; the cable work by Splicer J. L. Williams and Helper Ralph Wright, with the exception of the arc welding repair which was done by Smead Grubbs, of the Fort Smith maintenance organization.

▼ ▼

Inductive Interference Not All Due to Power Lines

Rural electrification has brought inductive interference on rural telephone lines into great prominence. But power line induction is not the only source of interference on rural telephone lines as the exchange manager of the American Telephone Co. at Dighton, Kans., has discovered.

Complaints concerning inductive interference were received from subscribers on rural lines. Investigation showed that it was caused by induction from ranch fence wire that is electrically charged to shock cattle if they attempt to go through it. Thus another aid to the farmer brings trouble to the telephone line.

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This experience is typical in the recent history of many companies which have found financial stability through Strowger Automatic operation. With future traffic trends unpredictable, the flexibility and ready adaptability of this equipment becomes doubly important. Its elimination of a heavy, fixed drain for operator expense is also of inestimable financial aid to the operating company. For greatest flexibility and long term economy, this time-proved equipment has no equal. May we figure with you on your requirements?

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Michigan Telephone Men Urge a United Front

By STANLEY R. EDWARDS

ALERT TO MAJOR PROBLEMS of the industry, telephone men of Wolverine state—assembled for third annual convention of Michigan Independent Telephone Association—point to need for a united front in educating regulatory bodies as well as subscribers to cooperate in working toward ideal telephone service, proper wages and a fair return for capital invested

INCREASING attendance at the annual meetings of the Michigan Independent Telephone Association indicates the substantial progress which is being made by this young association. The attendance at the association's third annual convention—held July 27 and 28 at Hotel Olds, Lansing—was at least one-third greater than that at the convention a year ago and 50 per cent greater than the attendance at the first annual meeting in 1936.

With this progress toward a strong and influential organization, the officers and directors are looking forward to the employment of a full-time secretary. This was discussed by President O. M. Vaughan, of South Haven, in his annual address, by one of the directors and by one of the program speakers before the convention.

While no action was taken by the convention, the plan apparently meets with favor. For its accomplishment, however, financial support of the smaller companies is essential and it is believed that a sufficient amount will be secured as to insure the employment of a full-time secretary.

The first day of the convention was given over to the reports of the officers and to discussions of the association's business. The annual banquet that evening brought out a good crowd which provided its own entertainment under the direction of a versatile master of ceremonies.

The second day of the convention was devoted to addresses on subjects of particular interest to the small companies. The discussions included roadside development along state highways, engineering problems connected with rural lines and small offices, taxes, and rural electrification.

All Officers and Directors Re-elected

All directors and officers were re-elected at the concluding session on Thursday afternoon, July 28, as follows: President, O. M. Vaughan, South Haven; vice-president, W. J. Melchers, Sr., Owosso; and secretary-treasurer, Jane McNally, Lansing.

Directors: District No. 1, H. R. Christianson, Muskegon, and R. C. Smith, Homer; District No. 2, Chas. W. Cheeney, Chesaning, H. S. Bradstreet, Rollin, and W. R. Stafford, Port Hope. District No. 3, B. R. Sage, Central Lake, and Ernest Sprague, Lake City. District No. 4, P. E. Taylor, Pickford.

Among the resolutions adopted was one protesting the proposed FCC uniform system of accounts for Class C companies as imposing an unnecessary, complicated, burdensome and expensive system of accounts on small companies and it was stated that the results obtained will be far from commensurate with the burdens imposed.

Another resolution concerned rural electrification. It approved the proposed amendment to the Rural Electrification Act introduced in Congress at the last session. Passage of the amendment was urged upon the Michigan Senators and Representatives in Congress.

The last resolution recommended to the directors that district meetings be held in each district of the state this fall.

At the first session of the convention on Wednesday afternoon, July 27, Clarence C. Carlton, of Lansing, secretary of the Motor Wheel Corp., extended a welcome to the telephone people in a humorous manner underlying which was much food for thought. Predicting better times, Mr. Carlton stated that the "Sales Mean Jobs" drive is paying dividends. He gave figures to indicate that business is improving and emphasized that advertising provides the spearhead for any campaign to get business.

H. R. Christianson, of Muskegon, in responding to the welcome, stated that telephone companies are always interested in moves which benefit the communities which they serve.

In presenting the secretary-treasurer's report, Mrs. Jane McNally, of Lansing, stated that the association membership totals 139, of which 60 are charter members, 63 associate individual members, and 16 associated manufacturing members. The financial report showed a balance on hand with practically all membership dues paid.

Educate the Public Urges Association President

In his address as president, Dr. Vaughan discussed regulation and value of educating the public relative to telephone service. He spoke of the importance of the association having a full-time secretary and the increased service which the association could render members.

"Although we are young in years as compared to most state associations," said Dr. Vaughan, "I believe we should at this time make an appraisal of the workings of our association and see what we are getting out of it, what good it is possible to receive from it, and what we can do to improve it.

"The old saying, 'You get out of anything in proportion to what you put in,' is also true in regard to our association. If we all worked to see how many members we could secure, we might not reach 100 per cent of all the Michigan Independent companies, but I am sure it would be well in the 90s.

It is my opinion that we have

proven the necessity and good that can be derived from a state association. The biggest improvement we could make would be to have an all-time secretary. This has been discussed at our district meetings and by your board of directors.

We found practically 100 per cent of those contacted are in favor of an all-time secretary; but before we can have one we must have more members, and we must have a new schedule of dues in order to take care of the cost. It will require at least a minimum fee of $10 per year.

The Public's Interest in Reduced Rates

"It is my opinion that telephone companies are not informing the public enough about their business. We can not expect the public to accept proper rates unless they feel assured in their own minds that they are fair. Our regulatory bodies are not always fair to both the public, telephone employe and the investor. The large majority of the people are willing to pay rates that will justify proper wages to telephone employes and a fair return to investors in telephone property.

They expect that regulatory bodies will tell them what is fair; but I am afraid that our regulatory bodies are not always looking at rates in this light. Making the headlines in regard to cutting rates never got any political party votes. And the only way in my opinion to stop this is by proper education of our subscribers by giving them the true facts about our business. Increased telephone costs mean just one thing—increased rates.

The reduction of toll rates means increased exchange rates. This is not fair to telephone subscribers because practically all studies will show that 10 per cent of our subscribers create 90 per cent of our toll business. Is it fair to make 90 per cent of our subscribers help pay the other 10 per cent's toll bill? This is what will happen if our regulatory bodies insist on cutting toll rates.

Telephone companies are not in any financial condition to have their toll income cut without having it replaced. The only way to replace the lost revenue is by increased exchange rates.

The telephone-using public will not stand for decreased toll rates when they realize that they must pay for the reduction through increased exchange rates. Will our exchange subscribers wake up soon enough to prevent cuts in toll rates?

Public's Erroneous Conception of Telephone Profits

"Telephone people have always been so careful not to tell the public about their business that today the public has an erroneous conception about the profits of operating a telephone plant. We are to blame for this and must accept the responsibility for this condition. The only way we can correct this false impression is by

DR. O. M. VAUGHAN, of South Haven, again re-elected president of the Michigan association, emphasized the urgent need for educating subscribers in regard to the costs of furnishing service.

educating the public to the facts and costs of furnishing telephone service.

The large majority of people do not want telephone companies to furnish telephone service below cost or without a fair profit, but they feel that we are not telling the truth about telephone costs and—I am sorry to say—that our regulatory bodies are not helping the telephone companies to correct this false impression.

Our telephone companies should be praised for their many great savings in telephone operating costs; but we are at the end of the rope, and have been for some time, because we have been robbing the investor of his just returns and giving it to the telephone subscriber.

All added costs to telephone operation must be borne by the telephone subscribers, and it is my opinion that they do not realize this. When they do awaken to the facts, we will not have all of the increased taxes and extra costs placed against telephone companies if the public have to pay them. Our only way to bring this to the attention of our subscribers is by educating them in regard to the cost of furnishing telephone service.

Why are so many of our smaller companies in such bad financial condition today? The answer is that they have never had adequate rates to pay fair wages to their employes, to collect a proper depreciation (which is now being brought home very forcibly as their plants are wearing out); and after all costs have been taken care of there has not been enough left to pay a fair return on their investment. The increasing costs which have been added during the past few years have just been added weight to a sinking ship. The result has been that smaller companies have been unable to render the best telephone service to the public.

This brings up the question: 'What can our association do about it?'

First: United we are in a better position to bring the facts to the attention of our subscribers.

Second: We must prove the truth about the cost of telephone service.

Third: Through our association we must show our strength; we must demand proper rates so that we will be able to give the people the best kind of telephone service.

Fourth: We must educate our farmers to the necessity of telephone service.

Fifth: We must prove to our different taxing bodies that all added taxes must from necessity be passed on to the telephone subscriber.

United we are in a much better position to carry on the education of both our subscriber and our regulatory bodies.

The large majority of telephone companies want to be honest with their government and their subscribers; and they want (and rightly expect) their government and their subscribers to be honest with them. They expect governmental regulatory bodies to protect their investment dollar as well as to protect the telephone subscriber.

There is only one way we can obtain proper consideration for both the telephone subscriber and the investor's dollar; and that is by educating the public in regard to the telephone business and by the reaction of public opinion on our regulatory bodies in that they will always consider in their decisions the following factors: the subscriber, those employed in the telephone business and the investor in telephone property. They must refrain from making decisions only for political purposes.

Compare the demands on telephone companies today with those of 30 years ago. Today, the telephone subscriber expects to be able to talk to any place in the world where

there is telephone service. Thirty years ago if a subscriber could make himself heard over a telephone wire for 50 miles, he thought it was wonderful. You must give credit to telephone companies for their wonderful improvement in toll service and the reductions in its costs.

But what about exchange service? The majority of telephone subscribers are receiving far better service than they were receiving 30 years ago but the majority of them are not paying enough for that exchange service to allow the telephone companies to pay fair wages to keep their telephone plant in good condition and to pay the investors in their property a fair return.

If we are to continue to give good service and be able to take advantage of new improvements, we must receive enough income to guarantee fair wages to maintain a good plant and give to the investor a fair return. Today investors are being driven away from the utilities field because we can not show our ability to maintain a fair plant, to show a fair depreciation rate, and a fair return on our investment from our present exchange rates.

We must look at the true facts and accept our responsibility for the conditions we find confronting ourselves. There is no use crying over spilt milk, but telephone people can take their lesson and, by a united front, we can correct these conditions very much faster by having an association rather than acting as individuals.

Educating the public in regard to our business is the only weapon we have to put the telephone business on sound ground so that we will always have investors ready with cash to invest in telephone property.

An association composed of a large percentage of the Independent companies of Michigan with everyone cooperating will bring ideal regulation quicker than would ever be possible by individuals alone. Therefore, let all of us get behind our association 100 per cent and work for ideal telephone service to all, with proper wages to telephone workers and a fair return on the invested capital in telephone properties.

Our business is going to be made safe only when public opinion realizes that we want to give the best of service and only ask for fair wages for our employes and a fair return on our investment.

We will obtain the proper public opinion only from a public educated in regard to telephone costs and operations."

"Full-Time Secretary" was the subject ably presented by W. H. Beck, of Indianapolis, Ind., secretary-treasurer of the Indiana Telephone Association. Mr. Beck effectively presented a complete analysis of the work of a state telephone association's secretary.

Answering his own question as to whether there is work enough for a full-time secretary, Mr. Beck declared that in normal times a secretary is kept busy and in abnormal

W. J. MELCHERS, veteran Independent telephone man and vice-president and general manager of the Union Telephone Co., of Owosso, was re-elected vice-president of the Michigan association.

times, such as during legislative sessions, he has to call upon members for assistance.

The orders as to a secretary's work come from the board of directors and the executive committee. In general, the purpose of a telephone association is to protect the telephone investment. Just what is meant was fully discussed by Mr. Beck, who cited several cases to illustrate his points.

The association's secretary must have information of many kinds accessible. He must know about various laws and have a great amount of data on file. He must have contacts with the engineers of the state commission and with various legislators. In rural electrification problems, the secretary can be of great assistance. He also helps in sales campaigns and aids in the economical maintenance of plants and the setting of traffic standards.

Stating that "information today is like news; it gets stale," Mr. Beck said that in Indiana the telephone is used to give the member companies quick information. Chairmen of seven district organizations are telephoned by the secretary's office and they transmit the information to a committee of three who, in turn, telephone it to others until every company in that district is informed.

Bulletins are issued, normally, once a month and contain brief information of general interest. Referring to programs for district and state meetings, Mr. Beck stated they should cover plant, accounting, commercial and traffic topics, with sufficient entertainment to provide the cordial fellowship which is necessary.

Various cases where the association had been of great value to member companies were related by Mr. Beck to show that an association's secretary has his eyes open, is willing to work and to listen to troubles. The service which he renders is not confined entirely to telephone matters, but includes personal affairs as well, it was stated in connection with an illustrative case.

Following Mr. Beck's excellent presentation of a secretary's duties and their importance to telephone companies, there was a discussion of association membership and why the small Michigan companies are not members. It was stated that there is more trouble ahead, more report forms, more accounting and more taxes. Certainly, every telephone company in Michigan should be a member of the association was the thought expressed.

"The Michigan association," declared President Vaughan, "is operating for the benefit of the small companies, and in the end the larger companies will benefit. We want the small companies to take the lead."

Committees were appointed by President Vaughan as follows:

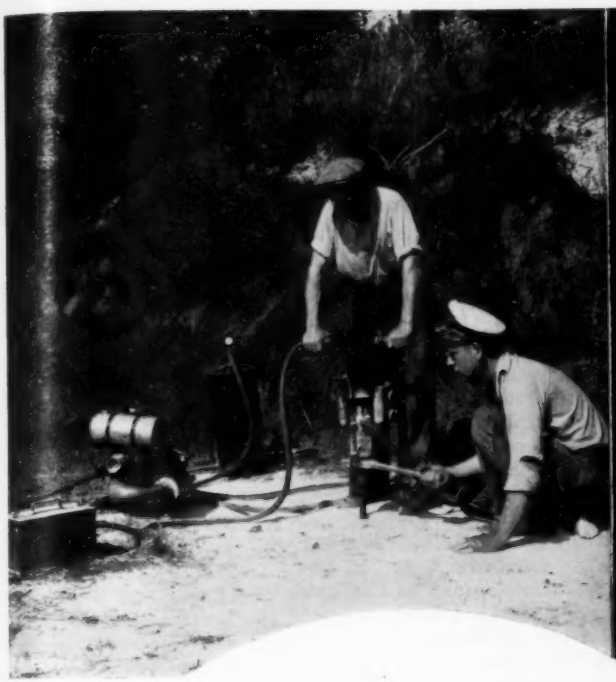
Resolutions: Chas. W. Cheeney, Chesaning; W. F. Bradstreet, Rollin; C. E. Smith, Morenci, and Fred E. Bohne, Charlotte.

Auditing: R. C. Smith, Homer; R. E. Putnam, Muskegon, and W. R. Stafford, Port Hope.

Nominating: J. A. Bridgeman, Owosso; N. H. Wing, Grass Lake, and W. J. Helli, Ironwood.

Open Forum Discusses Rural Sales

In the discussions at the opening of the Thursday morning session, J. A. Bridgeman, of Owosso, gave a concise, well-worded report of the conference of the Class A and B member companies of the United States Independent Telephone Association held in Chicago in June. He



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referred particularly to the discussions relative to rural electrification and toll compensation.

In a discussion of the rural telephone market, B. J. O'Connell, of the Michigan Bell Telephone Co., Detroit, reported on the results, from a sales standpoint, of the rural canvass made by his company. He brought up-to-date the report made on rural sales at last year's convention by W. C. Patterson, of the Michigan Bell.

Mr. O'Connell stated that the market was first tested by three salesmen and because of satisfactory experience with these three, the staff was increased to ten. It was found that the market could be canvassed on a twelve-month basis with a different appeal in the winter than in the summer. The sales were somewhat constant throughout the winter months. During April, May and June, 25,000 interviews resulted in 2,635 sales—an average of 1.3 per cent sales per man day.

A plan has been initiated by the Michigan Bell company of a commercial manager canvass, Mr. O'Connell stated. The manager is given sales training and then given help as indicated by his sales experiences. The company's general sales program is directed toward present customers taking increased service.

In reply to questions, Mr. O'Connell stated that a mortality study of 100 rural customers, at the end of a six-months' period, showed 90 per cent of the telephones in service. One salesman in the Jackson territory made eight sales in a seven-day period, and later 18 sales came in from that same territory, probably as a result of the salesman's activity. It was stated that in a day a salesman had ten completed interviews or cases but to do so he probably called on 15 or 20 parties.

The farmers are demanding the best service, such as handsets and streamlined telephones, whenever they can afford it. They appreciate the special attention given them as indicating their importance to the company. Not a quick buyer, the farmer has a tendency to resent pressure.

W. J. Melchers, Owosso, outlined the intrastate toll rate situation in response to a request from Dr. Vaughan.

The round-table discussion was closed with the answering of questions relative to the proposed Class C accounting system of the FCC by Ranford Dunlap, of Fort Wayne, Ind.

Mr. Dunlap stated that the state commission has not yet adopted a system of continuing property records. The FCC has sent out a draft of a continuing property record, but the more it is studied the more details, it is found, have to be kept. He commented upon the expense of establishing and the difficulties of keeping up this continuing property record.

In discussing the proposed FCC Class C accounting system, Mr. Dunlap stated there is only one company in Michigan that comes under it, but there is the possibility of the Michigan Public Utilities Commission adopting the system for its Class C companies.

Mr. Dunlap gave figures showing the increase in the number of accounts in the new system over the old. He pointed out that it would be necessary to make inventories, appraisals and classification of property accounts, while adoption of the proposed system would not add anything to service improvement but would add to company expenses.

In closing Mr. Dunlap stated it is very possible that the system may be passed onto the Class D companies, those having annual incomes under $25,000.

The Telephone Situation From a National Viewpoint

"The National Situation" was discussed by Louis Pitcher, of Chicago, executive vice-president of the United States Independent Telephone Association. Mr. Pitcher briefly referred to the effect that inflation, if it comes, will have upon the telephone business. The rates of all telephone companies would be upset and they could not be changed, through the lengthy process of petitioning the regulatory bodies, quickly enough to keep up with inflation.

He referred to the cost of installing and keeping up the FCC proposed accounting system for Class C companies and stated that in about ten years it would be necessary to start the accounting all over again. On that basis, the overall cost would be about one dollar per station per year.

Taking up the wage and hour bill, Mr. Pitcher declared that there is nothing in the bill to the effect that it does not apply to small telephone companies. His opinion is that it does apply at the present time and he declared that the companies should proceed on the theory that they are under the law. "Until the United States Supreme Court decides one way or another as to the definition of 'interstate commerce,' your guess is as good as the attorneys'," he stated.

Figures were quoted by the speaker to show that the added expense of conforming to the wage and hour bill will be much greater than any profits the telephone company may make. In fact, operating results will show large losses if the act is enforced on the telephone industry.

The administrator of the wage and hour act will commence work August 15 and boards representing various industries will be appointed by him. It is hoped that the United States Independent Telephone Association will be represented on the board having to do with the telephone industry, if one is appointed.

R. E. Palmer, of Lansing, chief forester of the Michigan Highway Department, discussing "Public Utility Pole Lines and Roadside Development on Michigan State Highways," outlined the purposes of the Michigan highway development plan. He referred to erosion control by use of vines and plants, the spraying of trees, and the value of trees along the highways. Roads through wooded areas have materially lower maintenance cost than any other sections due to snow not drifting. Thus, in the wooded areas 400-foot rights-of-way have been obtained.

Roadside parks, he stated, have a certain value in cutting down accidents for many motorists stop and rest in them. The 2,500 picnic tables now along the highways are just as insufficient as when there were only 100 tables.

Taking up the subject of poles, Mr. Palmer stated it is the department's general policy to locate pole lines at the back side of the rights-of-way. This reduces the cost of mowing grass around the poles and guy wires, which is a considerable item. He also stated that tree trimming is avoided by the use of short poles to go under the trees, or longer poles to go over them, as required by conditions.

Closely followed was the address by R. Foulkrod, Detroit, plant extension engineer, Michigan Bell Telephone Co., on the subject, "Rural Line and Small Office Engineering Problems." Mr. Foulkrod presented data as to the number of small offices and rural customers in the state. There are about 530 central offices serving under 1,000 stations each which are, in general, located mostly in the rural areas.

Of the 105,500 magneto stations in the state, 59,000 are rural. Approximately one-half of the magneto sta-

tions are served by the Independent companies and the other half by the Michigan Bell. Of the total Michigan Bell stations, approximately 8 per cent are magneto.

Studies of small office operation and rural line construction, made as a result of new developments both within and outside the telephone field, have resulted in the adoption by the Michigan Bell company of a tentative program for improving this service.

In considering the problem of engineering rural lines from the outside plant standpoint only, Mr. Foulkrod stated that the company is following the practice of building and rehabilitating rural plant for a maximum of eight stations per line with certain exceptions. The rural lines are designed to a standard of transmission only slightly under that employed for urban subscribers in the same exchange.

The speaker commented on long-span construction with high tensile strength steel wire and also buried rural lines, both new types of construction which are being tried.

Taking up central office problems, he pointed to the trend toward common battery operation of rural lines with manual or dial service. The problem of the service company lines, the speaker stated, is one which must be solved in many small exchanges before completely satisfactory service can be given.

In conclusion Mr. Foulkrod told of the tentative program of the Michigan Bell company in rural territory. In general, rural stations will be converted to common battery manual or dial operation coincident with the installation of equipment replacing existing magneto central office equipment. Magneto stations now served from common battery manual offices will be converted to common battery operation in connection with the rehabilitation of existing rural outside plant.

The speaker closed his most interesting paper with a discussion of costs of the improved rural service. His address will be published in full in a future issue of TELEPHONY.

"Public Relations and Taxation" was the first topic discussed at the closing session of the convention on July 28. The speaker was Chester M. Martin, of Detroit, former state tax commissioner. Mr. Martin stated that valuations for rate making and for tax assessment are different and rightly so. He referred to the Utah Supreme Court decision (see page 32) and also quoted from the proceedings of the National Tax Association, both of which substantiated his statement.

Public relations and taxation, he stated, are now so closely related that one cannot function without the other, and because of this the matter of taxes is important. Mr. Martin declared that the public must be informed in regard to taxes—who pays them and where the money goes—for many think they do not pay the tax.

The government has the support of the majority of the public and business has failed to win support. Stating that "pressure groups" use efforts to increase taxes, Mr. Martin discussed these various groups. He cited the collection of sales taxes and pointed out that 80 per cent of the people pay the bulk of them. Taxes must be brought out into the open for, in the opinion of the speaker, they form the major problem of the day.

In closing Mr. Martin stated that utilities have advanced more than any other industry in selling improvements but they have not sold themselves to the public.

Attention was directed to the Independent Pioneer Telephone Association of the United States by H. B. MacMeal, of Chicago, who urged that Michigan Independents join this organization which is carrying on the traditions of Independent telephony.

The Commission's Viewpoint Is Presented

"The Commission's Viewpoint" was presented by Charles S. Porritt, member, Michigan Public Utilities Commission, who stated that a considerable share of the work of the commission is in connection with the small Independent companies.

"Our commission is conducted with the realization that the big fellow is well able to take care of himself," he said. "He is financially able to employ competent counsel and engineers and accountants to guide his course, but the little fellow isn't always in a position to do this. Consequently, we feel that it is our duty to offer our advice and our facilities to the smaller companies when they require it; and we want every one of you to feel free to drop in on us at any time to discuss your problems with us."

The services of the engineering staff, headed by Verne H. Hufford, were cordially offered to the telephone men with the assurance that it would lend every assistance possible.

Mr. Porritt referred to the re-

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quirements for company filings of rules, rates and regulations and commended the splendid spirit of cooperation displayed by the telephone companies in complying with the commission orders issued in 1937.

The speaker discussed the installation of buried rural lines in certain sections by the Michigan Bell, the real test for which is expected to come this winter and in the early spring when frost causes the ground to expand and contract.

He briefly referred to the installation of automatic equipment in telephone exchanges and to the increasing number of applications before the commission from companies which want to install such equipment.

Mr. Porritt noted the decrease in so-called roadway companies which are being taken over by switchboard companies with resultant better service to the public.

He briefly referred to the commission's recent order reducing intrastate long distance tolls, pointing out that the smaller companies will be little affected by it because the bulk of their toll message business is made up of calls of short distances.

In conclusion, Mr. Porritt stated that the commission "felt justified in granting permission for several companies to increase their rates, and we have assisted many in establishing comprehensive rate schedules and in defining territories of companies . . . Our staff stands ready to lend assistance in all matters possible, even to the solution of legal problems.

"Of course, it becomes necessary, upon occasion, for the commission to take a firm stand in some matters, but we believe the industry respects us for being actuated by a desire to accomplish the greatest good for the greatest number."

The last speaker on the afternoon's program was Chas. C. Deering, Des Moines, Iowa, secretary-treasurer, United States Independent Telephone Association. Speaking on the subject, "Effects of REA on Telephone Service," Mr. Deering told of the original policy of the REA under Administrator Cooke, which was reversed by Administrator Carmody in May, 1937. He declared that Mr. Carmody's stand was an arbitrary one in refusing to share costs in metallicizing telephone lines where service is interfered with by REA electric power lines.

In Mr. Deering's opinion, rural electrification, in the long run, will have a good result in that there will be better telephone service, more telephones and better rates. Some companies will have difficulty in getting higher rates he stated as he advised making lines metallic. This will raise the standard of telephone service and enable adequate rates being obtained.

Following reports of the various committees and the election of officers and directors, Dr. Vaughan adjourned the convention with a brief comment upon the increased attendance over previous conventions.

Obituaries of Telephone Men

R. F. HARVEY, for a quarter century identified with the Woodbury (Conn.) Telephone Co., died July 15 at his home in Woodbury, at the age of 76, after an illness of two weeks following a heart attack.

Mr. Harvey was born in Washington, D. C., September 28, 1861. He moved to Minortown, near Woodbury, in 1867 and attended the public schools and the Old Parker academy of that city.

After teaching in Woodbury and Roxbury schools between 1882 and 1885, he became associated with his brother, the late Charles H. Harvey, in the general store business. From 1899 to 1904 he also operated his brother's stage coach business, which ran from Woodbury to Waterbury, working in the store at the same time.

In 1904 Mr. Harvey became associated with the Woodbury Telephone Co., and was a leader in its development and management until his retirement in 1929. Since that time he has been in the monument business.

Surviving Mr. Harvey are his two daughters, Lois and Harriet Harvey of Woodbury.

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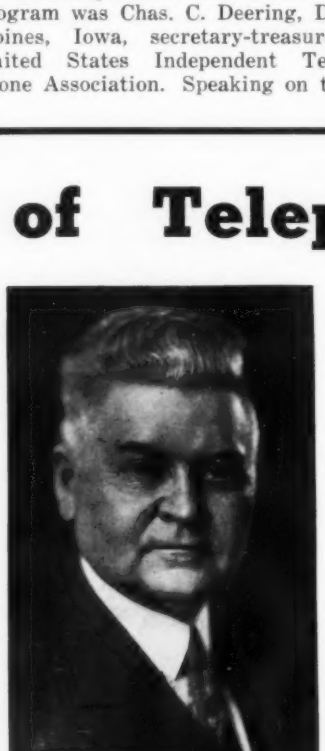
CURTIS H. ROTTGER, member of the board of directors of the Indiana Bell Telephone Co. and for nine years its president (1921-1930), died Sunday morning, July 31, at his home in Indianapolis, at the age of 74 years. Although apparently in good health, Mr. Rottger was stricken with a heart attack, following an attack of indigestion last week.



CURTIS H. ROTTGER, member of the board of directors of the Indiana Bell Telephone Co. and formerly its president, died July 31 at his home in Indianapolis.

Resigning from the presidency of the Indiana Bell April 24, 1930, after 47 years in the telephone field, Mr. Rottger served as chairman of the board of directors of the company for several months before retiring from active service. During the past eight years he has taken a prominent part in civic interests in his home community.

Mr. Rottger was born in Jacksonville, Ill., January 16, 1864. As a youth he played about the Western Union Telegraph Co. office at Jacksonville and soon learned to send telegraphic messages by key.

While attending high school, he obtained a position as night operator when the Jacksonville exchange was built in 1881 by the Jacksonville Telephone Co. In 1883, in the same year when he completed his schooling, the company was purchased by the Central Union Telephone Co.

With the latter company, Mr. Rottger began his distinguished telephone career in 1883, that carried him to the presidency of the Indiana company.

From 1884 to 1902 he served respectively, as manager of the Paris (Ill.), Muncie (Ind.), Jacksonville and Springfield (Ill.), exchanges. In 1902 he was appointed district manager of an area in Illinois comprising several cities.

Beginning in 1903 and up to February of 1914 he directed the company's affairs in Illinois as division superintendent, general superintendent and commercial superintendent.

In 1914, when each state within the territory of the Central Union Telephone Co. was placed on a territorial

basis from the standpoint of general management, Mr. Rottger was promoted to the position of general manager of the Illinois division. He continued in that position until December, 1920, when he became vice-president of the Indiana Bell Telephone Co.

On October 28, 1921, Mr. Rottger was elected president of the company, continuing in that position until his resignation in April, 1930. At that time he became chairman of the board of directors. On July 1, 1930, he retired from active work.

Unaccustomed to inactivity, however, he turned to personal business affairs and took a prominent part in civic interests. He served for several years as director of the Indianapolis Chamber of Commerce and was general chairman of its industrial commission. He also had been a member of the executive committee of the Indianapolis Community Fund and was a director and past president of the Better Business Bureau, Inc.

Mr. Rottger served without remuneration as receiver for the City Trust Co., Indianapolis, when he was appointed to that post in November, 1930.

At the time of his death he was a director of the Columbia Club and a member of the Rotary Club, Woodstock Club and the Central Christian Church.

Mr. Rottger became a member of the Telephone Pioneers of America, in 1912, a year after its organization. He directed the organization of Hoosier State Chapter No. 16 in 1922 and in 1921 was elected vice-president of the national organization. He was elected senior vice-president of the latter group in 1930.

His executive ability as general manager guided the Illinois division of the Central Union Telephone Co. through especially trying times and his achievements with the Indiana Bell were even more noteworthy. In Illinois, at the close of the World War, when prices for all commodities were soaring sky-high, the question of securing adequate rates for existence became paramount. Mr. Rottger met this situation with tact, judgment and courage. Later through his efforts the Indiana Bell, under somewhat similar circumstances, was placed on a sound financial basis.

Friends of Mr. Rottger were legion in the Indiana Bell organization and throughout the Bell System. His popularity came from his frank and sincere manner and his deep sympathy and understanding. He knew the problems of the linemen, operators and clerks, as well as of those in supervisory capacities, because he had had the same problems and had performed the same tasks during the various stages of his telephone career.

His friends were numbered not only among those in the telephone industry. He was always interested in business, industrial and civic affairs and since going to Indianapolis was known as a leader in the various activities of the community.

Survivors of Mr. Rottger are his widow, Mrs. Jessie A. Rottger, and a granddaughter, Miss Rosemary Jane Rottger.

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Cautions Employes to Watch Out for Poison Ivy

In the colored cartoon supplement of the Columbus (Ohio) Sunday Dispatch of July 31 is reproduced the warning given by the Ohio Bell Telephone Co. to its linemen in a recent employes' bulletin to beware of poison ivy. The caption story underneath an illustration in color of this pest and joy-killer for many human beings ends with these lines quoted from the telephone company bulletin: "With leaves three, leave it be!"

Answers to Traffic Questions on Page 15

1. The rate in effect at the originating point at the time of the start of conversation will apply on the call.
2. If the calling party asks to have the call tried again as a station-to-station call, it will be considered as a new call and a second ticket must be made. The first ticket is canceled and is subject to a report charge. If the calling party requests the operator to leave word for someone who can accept the charge, the call will be subject to the person-to-person rate and the original ticket is used.
3. A new ticket should be written. The first call is considered as a completed call.
4. The same rule should apply to non-subscribers that is followed for subscribers in your exchange.
5. Endeavor to make the number of minutes equal to the number of minutes for which charge would have been made if the service had been normal.

On Guard

INSTALL Cook Central Office Protectors for sure protection against costly damage to your equipment by high potentials and sneak currents.

The Cook No. 100 Central Office Protector is a favorite with engineers because of its self-soldering heat coils, simple design and facilities for easy testing.

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"Telephony's" Engineering Data

By B. C. Burden

Index, General.
August 6, 1938.
No. 45-A, page 16.

The contractor, duty-bound to follow the staking notes, in many cases has placed poles which are inadequate from the standpoint of vertical clearance between power and telephone wires and which have later needed to be replaced at considerable expense to the power district.

The National Electric Safety Code specifies in table No. 3 the required vertical clearance between power and telephone wires. It should be noted that these clearances are the minimum clearance that should be allowed. In general, they should be increased in order to take into account the normal creepage of anchors, stretching of line wires, etc.

Vertical clearances which the power districts should maintain over telephone circuits are given in Table No. 3, page 31, Handbook No. 10 of the Bureau of Standards. The principal requirements, shown in this table, are:

110-220 volts, power-service drop wires, two feet.
110-220 volts, line wires, four feet. (Note: A clearance of two feet may be permitted from low-voltage line wires where the supply conductor is above the communication conductor, provided the crossing is not within six feet of any pole concerned in the crossing.)
750-7,500 volts (including the neutral line conductor), power wires, four feet.
7,500-50,000 volts, power wires, six feet.
Power guy wires, two feet.

Rule 233-D states that "the vertical clearances given in table No. 3 shall be increased where the sum of the distances from the nearer supporting structure of each span to the point of intersection exceeds 100 feet. In such cases the normal clearance shall be increased by 0.1 foot for each 10 feet in excess of 100 feet."

This refers to the distance measured from the power pole to the point of cross-over, plus the distance from the telephone pole to the point of cross-over. From a practical standpoint it is highly desirable that the crossing poles be located so that the cross-over does not occur near the middle of the power span.

Mechanical Data

For the benefit of those who are interested in actually computing strength requirements for power-line crossings, to insure that they comply with code rules, the accompanying data and also that given on page 7 of this data series (Telephony of July 16) may be useful. Similar data dealing with other types of power conductors will be found in Bureau of Standards Handbook No. 10. It should be noted that there is some discrepancy between the information shown in the tables and that in the handbook. This data represents the latest information on this subject.

"Telephony's" Engineering Data

By B. C. Burden

Index, General.
August 6, 1938.
No. 45-A, page 17.

LONGITUDINAL LOADING DATA

This table gives the longitudinal stress under maximum condition that should be present in A. C. S. R. power conductors properly placed. (Assume 50 per cent of ultimate tension.)

No. 2 A. C. S. R. Wires	
Two wires	3,524 pounds
Three wires	5,286 pounds
Four wires	7,048 pounds
No. 4 A. C. S. R. Wires	
Two wires	2,288 pounds
Three wires	3,432 pounds
Four wires	4,576 pounds

It should be particularly noted that the aluminum steel reinforced conductors referred to are of the high tensile strength type and have a somewhat greater strength than shown in the handbook. This is also true of the Siemens-Martin steel guy strand.

APPROXIMATE LOAD DUE TO WIND AGAINST POLES, HEAVY LOADING

This table shows the force in foot pounds tending to break a pole at the ground line and due to wind against the pole. This is based on the heavy loading area.

Pole Height	Force in Foot Pounds
45	5,776
40	4,356
35	3,136
30	2,304

"Telephony's" Engineering Data

By B. C. Burden

Index, General.
August 6, 1938.
No. 46-A, page 1.

Government Technical Data at Low Cost

It is not generally appreciated that the United States government is one of the country's largest publishers. Each year numerous circulars and booklets dealing with many subjects are issued by the government printing office.

The writer has recently analyzed a large number of these government publications and lists below those booklets of particular interest to the radio or electrical student together with their prices. Any of these booklets may be obtained by writing the Superintendent of Documents, Washington, D. C., giving the number of booklets desired, and enclosing a remittance to cover. Remittance should be made by money order payable to the Superintendent of Documents.

List of Interesting Government Booklets

1. Theory and Performance of Rectifiers. Cir. No. 265 ..... $0.20
2. Units of Weight and Measure, Cir. No. M121 ..... .15
3. Electrical Measuring Instruments, Cir. No. 20 ..... .15
4. Theory of Determination of Ultra-Radio Frequencies by Standing Waves on Wires, Cir. No. 491 ..... .15
5. Electrical Units and Standards, Cir. No. 60 ..... .15
6. Architectural Acoustics, Cir. No. 396 ..... .05
7. Principles of Radio Transmission and Reception with Antenna and Coil Aerials, Cir. No. 354 ..... .10
8. Information for the Amateur Designer of Transformers, Cir. No. 408 ..... .05
9. Elementary Principles of Radio Telegraphy and Telephony, Cir. No. 1064 ..... .10
10. Primary Batteries, Cir. No. 1112 ..... .10
11. Introduction to Line Radio Communication, Cir. No. 1114 ..... .10
12. Development of Visual Type Airway Radio Beam System, Cir. No. 159 ..... .20
13. Protection of Electrical Circuits and Equipment Against Lightning, Mis. Cir. No. 95 ..... .25
14. Electrolysis and Its Mitigation, Cir. No. 52 ..... .35
15. Earth Resistance and the Relation to Electrolysis of U. G. Structures, Cir. No. 26 ..... .15
16. Safety Rules for the Installation and Maintenance of Supply and Communication Lines, Handbook No. 10 ..... .60

Commission and Court Activities

Rochester (N. Y.) FCC Case to Supreme Court

The Rochester Telephone Corp., Rochester, N. Y., intends to appeal from the decision of the Federal statutory court holding it to be under full jurisdiction of the Federal Communications Commission (TELEPHONY of July 16) because of control by the New York Telephone Co.

"The basis of the appeal," said President John P. Boylan of the Rochester company, "will be that the evidence not only fails to show any control by the New York Telephone Co. but, on the contrary, shows conclusively that the Rochester Telephone Corp. is locally controlled.

"This control is exercised by the three local voting trustees, Fred C. Goodwin, Raymond N. Ball and John P. Boylan, who hold a majority of the common stock in the company. These voting trustees have elected 10 local directors out of a total of 15, and the actual operation of the affairs of the company is in the hands and under the control of these directors.

At the time the company first applied for exemption from the provisions of the Communications Act it was thought considerable additional expense would be involved in furnishing reports, data and other information required by the Federal Communications Commission. Since this proceeding was begun nearly three years ago the accounting system of the New York Public Service Commission and the Federal Communications Commission has been harmonized to such an extent that the item of expense involved in yielding to the jurisdiction of the commission is no longer of such importance.

Nevertheless, since the company is not under the direct or indirect control of the New York Telephone Co., we feel we should exhaust every effort to correct whatever erroneous impression may result from the court's findings."

Under the statutes an appeal from a three-judge federal court goes directly to the United States Supreme Court, which will probably consider this appeal when it convenes in the fall.

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To Consider Changes in Pennsylvania Utility Law

Last week the Pennsylvania legislature in special session took up consideration of changes in the state public utility law to prevent the law from becoming virtually impotent as a result of the recent decision of the state supreme court in the case of York Railways vs. Public Utility Commission.

The court specifically knocked out the security issue provision of the utility law and inferentially invalidated several other important sections in which the state commission was given discretion to authorize exemptions. This, the court held, is unlawful delegation of authority.

The Pennsylvania Public Utility Commission has recommended changes in seven sections of the law upon which, it said, depend the continued effective regulation and the forward movement of the present policy of the commission.

The following are among the important changes covered in a bill presented to the House by Representative Leo A. Achterman:

(1) Specify the standards of commission regulation of issuance of securities by utilities. The state supreme court ruled the commission under the present law lacked authority to regulate security issues.

(2) Insure the commission's right to pass upon transfer and acquisition of property by utilities involving large sums of money. That section, relating to mergers, now is "probably unconstitutional," the court found.

(3) Clarify and strengthen a section forbidding utilities to enter into or extend contracts or agreements, give or receive services, donations, securities or properties with affiliated interests, unless the commission approves.

Other alterations would insert a word left out of the original act inadvertently, and revise regulations pertaining to the time of filing contracts and assessment of expenses of administering the act.

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Appeals from Arkansas Commission's REA Ruling

A ruling of the Arkansas State Utilities Commission that electric companies

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TELEPHONE WIRE STEEL STRAND

do not have to pay compensation to telephone companies for inductive interference with grounded telephone lines (TELEPHONY of June 4, page 26) was attacked in a petition filed July 13 in the second division circuit court at Little Rock by R. O. McConnell, Carroll county telephone operator.

Mr. McConnell named the commission and the Carroll County Electric Cooperative Corp. a rural electrification project, as defendants. He asked that the department's ruling be set aside and the matter referred back to the utilities commission with directions that permits be issued to electric concerns only with the stipulation that they should compensate telephone companies for inductive interference.

The petition said the Carroll electric cooperative erected lines which parallel telephone lines of the plaintiff and that the power lines interfere with the telephone service because electric lines use about 60 per cent of the electricity in the immediate ground area.

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Telephone Company Sues to Recover Taxes

Suit for recovery of $37,382 in taxes alleged to have been wrongfully assessed and paid to several cities in Riverside County, Calif., by the Southern California Telephone Co. was recently filed in Riverside by the telephone company.

The city of Corona is defendant for a suit of $880.88, Beaumont $141.29, Banning $243.72, Elsinore $60.23, Riverside $4,889.22 and Riverside County, $32,770.93. The taxes were paid under protest and grew out of the changes in the state law returning taxation of utility real property to local political units.

In a later action charging that the state board of equalization over-assessed properties of the company, the Southern California Telephone Co. filed suits in the superior court of Los Angeles County for the return of an aggregate amount of $1,600,000.

The suits are directed against the county of Los Angeles for an amount of $1,005,316, the city of Los Angeles for $434,833 and the Metropolitan Water District for $122,411. Various municipalities in the county are asked to return sums varying from $70 to $12,000.

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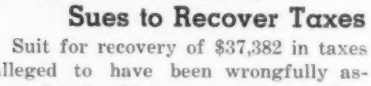

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Claims Bell Failed to Abide by Order

The Michigan Public Utilities Commission has filed with the Ingham County Circuit Court an answer to the amended bill of complaint recently filed by the Michigan Bell Telephone Co. In its answer the commission contends that its order of June 27, reducing Michigan toll rates, was not done at the expense of the local subscribers as is claimed by the Michigan Bell in its appeal to the Ingham County Circuit Court of the commission's order.

The commission contends in its answer that the company has failed to abide by a former commission order of 1936 in two major respects. First, it charged more than 5½ millions of depreciation expense to the service in 1937, whereas the commission in July, 1936, decided that it was to charge only 3½ millions. Second, the commission found that the Michigan Bell company in 1937 paid the American Telephone & Telegraph Co. $357,299.78 over and above the amount found reasonable in 1936.

These sums will permit savings to subscribers far in excess of the $550,000 annual reduction in toll charges contemplated by the commission's recent order, it was pointed out in the answer. The court hearing will be held August 29.

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Overrules Utah Statutes on Utility Valuations

The Utah Supreme Court, in a decision in the case of State of Utah ex rel. Public Service Commission of Utah, et al., vs. Southern Pacific Co., et al., held unconstitutional certain 1937 statutes providing that valuation of properties of utilities as fixed by the public service commission shall be accepted by the tax commission for tax purposes, finding them to be violative of provisions of the Utah constitution.

The court found that the tax commission would be compelled to use as a basis for tax assessment a valuation which might be different from the value of the property in money. Furthermore, under the constitution the power to assess for taxation—which includes the placing of valuation—is given to the tax commission; and the legislature has no power to delegate that power to any other office or commission.

In discussing the differences between the problem of determining the fair value of a utility property as a rate base and that of arriving at its value in money for taxation purposes, the court said:

"The problems of determining the fair value of utility property as a rate base and that of arriving at its value in money for taxation purposes are extremely complex and have given the courts and economists no end of concern. The legislature has attempted by one single stroke to solve problems that have baffled the courts ever since government has been controlling rate-making by public utilities.

Prior to the enactment of the challenged amendments, the public service commission had plenary power to regulate utilities and to fix rates which should be fair and reasonable. There was no legislative requirement that the utility rates be based on the fair value of the property, but only that they be fair and reasonable. The state tax commission by constitution and statute was required to assess tangible utility property at its 'value in money' for taxation purposes.

The courts have never held to any rigid formula or exclusive test for determining the value of utility property as a rate base but have recognized a wide discretion in the railroad and public service commissions in the exercise of their power of determining fair and reasonable rates which should yield a fair return to the utilities and also be fair to the consumer and the public.

Many of the factors to be considered in determining value are common for both purposes, but emphasis is placed at different ends of the scale. The elements usually considered are: Original or historical cost, cost of reproduction new less depreciation, conditions of competition in the industry, efficiency or lack of it in management, bonded indebtedness, current market value of stock and bonds, actual present earnings and earnings over a period of years. . . .

In fixing rates the value of service to the consumer, conditions of competition, if any, the ability of the proposed rates to attract and hold business and yield a fair return on the rate base value, will all be considered. Once rates are approved, the actual earning capacity of the utility under such rates is the important factor in creating a market value of the utility. The com-

(*Please turn to page* 36)

In the Nation's Capital

(*Concluded from page* 17)

price of phonograph recordings of the better music. If the popular swing recordings can be made, sold (and become obsolete in a few months) at a few nickels a copy, why, the writer asked, should it be necessary to spend folding money for classical recordings of permanent sales value? He smelled an unlawful conspiracy to restrain trade and asked the Justice Department to look into it.

Well, this isn't a serious case, and it's only a sample of various complaints that come into the Justice Department. But it's interesting to see how equally reasonable two diametrically opposed remedies can be. The Justice Department, as is routine in such cases, sent inquiries to various recording companies and received two replies as different from each other as white is from black.

The first company, which we will call A, said in effect: "If the leading recording companies could agree on recording rights for various classical numbers, we could not only afford to pay more money for superior recording artists, but we could eliminate duplicate stock and thereby lower retail costs. But such an agreement would violate the Sherman and Clayton Acts unless the federal government consented to it along the lines of the compact in the Appalachian Coals case."

In other words, the recording company suggested that if company A were given the exclusive rights to record, let us say, the works of Shubert, while company B were given the right to Beethoven, and so forth, they could cut down the expense of making competitive recordings and carrying surplus stock on the shelves of the record dealers.

But listen to what company B says to this idea. B company, somehow getting wind of company's A proposal, wrote in and said that the whole idea of parceling out the classics was not only illegal but uneconomic. Competition, said that company, is what spurs recorders to make the best effort, with the result that the public is given a choice of rival productions and can select the one having the most artistic merit.

Well, we've all heard those arguments before. They cannot be decided categorically. In general terms, one line of reasoning is about as reasonable as the other. It is only in specific application to concrete cases that the issue of Competition vs. Monopoly can be decided judiciously.

Incidentally, if you are interested in this whole probe of whether monopoly is good, bad, or indifferent for the various units of our economic life, you should read the latest volume published by Brookings Institution, entitled "Industrial Price Policies and Economic Progress," by Edwin G. Nourse and Horace B. Drury.

This book tries to point out where industrial monopoly is harmful and where it is indispensable. It tries to answer such important questions as: (1) Can prices be reduced with profit? (2) What factors complicate price making? (3) when are large corporations helpful? (4) What does free business enterprise involve?

And here is a striking passage from the book which caught this correspondent's eye: The authors strive to show that often competition may seem to die when, in fact, it is only growing up to a bigger, broader status. Thus, competition between oil companies may yield to a new and more dynamic competition between oil and a competitive fuel. Under such circumstances the industry naturally solidifies within itself so as to be better able to cope with the new rival outside of its ranks. As Messrs. Nourse and Drury pointed out:

"The competition among pigmies, which some are eager to try to restore, is puny by comparison. Competition is quite as keen and much more productive of results when we find industrial giants marshaling their mighty resources to perfect new techniques and new schemes of organization through whose use more and better goods may be put within reach of the masses."

COMING CONVENTIONS

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 21, 22 and 23.

South Dakota Telephone Association, Mitchell, October 5 and 6.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 18, 19, 20 and 21.

Independent Pioneer Telephone Association of the United States, Hotel Stevens, Chicago, Thursday, October 20.

Virginia Independent Telephone Association, Hotel John Marshall, Richmond, November 3 and 4.

Tennessee Independent Telephone Association, Hermitage Hotel, Nashville, November 14-15.

Alabama Independent Telephone Association, Jefferson Davis Hotel, Montgomery, November 28 and 29.

With all this Public Utility Turmoil . . .

Several important questions come to mind—

Is your company complying with the law relative to property identification?

Is your company spending needless sums in meeting legal requirements for property identification?

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The Manufacturers' Department

Comprehensive Treatise on Western Red Cedar Poles

"Western Red Cedar: The Ideal Pole" is the theme of an attractive and informative book prepared recently by J. P. Wentling, director of research of the Western Red and Northern White Cedar Association and published by it. In its 70-odd pages (8½ ins. by 11 ins.) is presented in brief the story of Western red cedar as used for telephone communication and electrical distribution lines, with the aid of photographic reproductions, diagrams and charts.

In discussing cedar in general and Western red cedar in particular, the author says:

"Not only does nature build Western red cedar trees ideally in form and under identical mechanical stresses of pole use, but also so preserves the unusually large amount of heartwood that Western red cedar is famous for its great durability or resistance to decay. The high impermeability to liquids of this wood retards leaching of the inherent toxic principles.

Because of the high degree of durability, only the sapwood at the critical ground line area receives preservative treatment to protect and retain its original circumference. Western red cedar poles need only about 10 per cent processing to fit them for lasting and dependable line service."

Availability, strength, durability, adaptability and stability of Western red cedar poles are discussed at some length in this interesting publication. Several pages are devoted to the seasoning and treating of poles, with preservative treatment specifications and American tentative standard specifications and American standard dimensions of Western red cedar poles.

Cooperating in the production of this publication were the following members of the Western Red and Northern White Cedar Association: Bell Lumber & Pole Co., B. J. Carney & Co., Leavitt-Naugle Co., National Pole & Treating Co., Naugle Pole & Tie Corp., Page & Hill Co., T. M. Partridge Lumber Co., Schaefer-Hitchcock Co., Valentine Clark Corp. and Weyerhaeuser Pole Co.

▼ ▼

Drop Wire Grip New in Design

The James R. Kearney Corp., St. Louis, Mo., is now offering to the telephone industry the Snub-R-Grip, a drop wire grip of revolutionary design, for securing twisted or parallel pair drop wire.

Sag is readily taken up or let out, the company states, by pulling or pushing the wire through the spiral, which is spot welded to the bail. The snubbing action of the Snub-R-Grip holds the wire and the insulation without damage to the insulation. Spot loading is prevented by the eight-inch long bearing surface.

Kearney's Snub-R-Grip for securing twisted or parallel pair drop wire.

Snub-R-Grips are said to be easy to install and to remove; moreover, they are 100 per cent salvagable.

▼ ▼

Twins Employed 50 Years By Automatic of Liverpool

Born in 1874 Charlie and Dick Hinde, twins, started to work 14 years later with the same company and in the same workshop in England, and at the same wage—two shilling, six pence per week, to be exact. Now, in 1938, to commemorate their completion of 50 years of unbroken service with the same company—Automatic Telephone & Electric Co., Ltd.—they were presented with gold medals studded with rubies and accompanied by substantial checks.

In the accompanying illustration, Sir Alexander Roger, chairman of the Automatic company, is shown presenting the medals of honor to these veteran employes. The medals are very appropriately designed to resemble an automatic telephone dial, with each "finger-hole" from "1" to "10" marked by a ruby.

Not only do the Hinde brothers work together; they take occasion to be ill together. When asked how much time he has been off during his 50 years' service, Dick thought hard, made a couple of calculations and answered, "three weeks."

Charlie, asked the same question, went through the same motions and replied, "three weeks"!

Both Dick and Charlie Hinde are craftsmen. Working in a department called "the model shop," they produce model mechanism and parts required for experimental and development purposes. Automatic telephones, street traffic signals, public "pull-handle" type street fire alarms and "totes" for horse and dog-racing are a few of the familiar objects, the creation of which is due in large part to the skill and ingenuity of the twins.

The changes in locality, and many other alterations which the company

Sir Alexander Roger, chairman of the Automatic Telephone & Electric Co., Ltd., Liverpool, England, is shown presenting gold medals studded with rubies to Charlie Hinde and Dick Hinde, twin brothers and skilled craftsmen in the company's experimental department, who recently rounded out 50 years of continuous service. The medals were fashioned in the shape of automatic dials with a ruby representing each of the 10 finger holes and each marking five years of service.

From left to right in the photograph are: Richard Hinde (better known as Dick); J. Nixon, works manager; A. F. Bennett, chief engineer; T. A. Eades, managing director; Sir Alexander Roger, chairman of board of directors; Charles Hinde (called Charlie by his friends and associates), and F. C. Burstall, manager.

has undergone since 1888 when the brothers became apprenticed, have not separated them. Originally their branch of the firm was located at Helsby, Cheshire, but the staff then consisted almost entirely of all Londoners. So it was deemed necessary to move to Liverpool, the actual premises being in Newington, off Renshaw street.

In 1897 the workshop went to Oldham Place. So did the twins. And in 1903 the workshop—yes, and the twins—went to Edge Lane. In 1911 what had been a department became a separate company under the name of Automatic Telephone Mfg. Co., Ltd., which in turn is known today as Automatic Telephone & Electric Co., Ltd. Incidentally, this is the largest automatic telephone manufacturing concern in the British Empire, a fact of which both Dick and Charlie are rather proud. And as they have watched and helped it to grow for 50 years, their pride can be excused them.

▼ ▼

Round Crossarm Brace Offered by Hubbard

A radical departure in crossarm brace design is embodied in the new round crossarm brace just made available to the field by Hubbard & Co., of Pittsburgh, Pa. Though compact and light, it is strong and easy to install. The brace is made of one continuous piece of ⅜-inch high carbon steel rod.

In marked contrast to the many parts to standard braces, the new Hubbard brace involves only two pieces. It is available in a variety of styles covering several methods of attachment.

These new Hubbard braces can best be installed on the arms while they are resting on the ground. In the case of combinations, the two parts should be placed in position before installing on the arm. Especially is this important when using those sizes that have a horizontal rag thread arm mounting.

To obtain the best results, the holes should be drilled to a maximum diameter of ⅜ inch. Washers may be used on the machine threaded types, if desired, but they are not necessary, the manufacturers state. Although rag threads are easily driven, they should not be revolved in the hole while installing.

Lag screw or machine bolt mountings at the pole are just as practical as the drive hook. In order to reclaim the braces, they should be driven out of the arm by means of a short ⅜-inch rod.

The new Hubbard single type brace may be used singly or in various combinations. One rag thread and one machine thread may be used together if desired, as well as a single brace on the tension side of an unbalanced arm.

To test the strength of a pair of No. 8301 single type braces, the company subjected one side of the crossarm to a ½-ton strain, 30 inches from the pole.

New Hubbard round crossarm brace.

As a result, the eye moved only slightly, as determined from the original impression in the wood.

▼ ▼

Change in Design of Lux Fire Extinguisher

A new improvement has been made recently in the Lux carbon dioxide fire extinguisher, manufactured by Walter Kidde & Co., Inc., Bloomfield, N. J. It consists of a change in the design of the control wheel on the operating valve of seat type extinguishers. Affording a better grip and providing more leverage, the new hand wheel is said to be easier to operate.

It is provided with a pull-out pin which is kept in tension at all times, thus assuring positive sealing. The manufacturers assert that with this Lux seat type valve premature operation due to vibration is impossible.

The extinguishing agent in all Lux units is carbon dioxide, considered by fire protection engineers as the best protection available for fighting conflagrations caused by the ignition of oil, gasoline and electrical discharges. More than that, carbon dioxide does not injure electrical equipment, a fact of great interest to telephone men, who know that usually the greatest damage resulting from fire in the central office is caused by the water used to extinguish the blaze.

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Recent Prices in the Metal Markets

New York, N. Y., August 1:—Copper steady; electrolytic spot, $10.12½; export, $10.42½, nominal. Tin steady; spot and nearby, $44.25; forward, $44.30. Lead steady; spot, New York, $4.90@4.95; East St. Louis, $4.75. Zinc steady; East St. Louis spot and forward $4.75. Pig iron, No. 2, frb Eastern Pennsylvania, $21; Buffalo, $20; Alabama, $16. Aluminum, virgin, 99 per cent, $20. Antimony, spot, $14. Quicksilver, $80@81. Platinum, pure, $36. Wolframite, $18@20, nominal.

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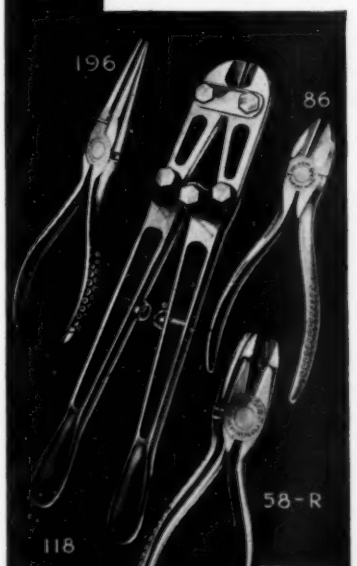

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118—BOLT & CABLE CUTTER. For cutting power, blade durability and structural strength there's nothing to equal this powerful overcapacity cutter. Handles of forged steel instead of easily broken malleable steel used in ordinary cutters. Cutting capacity ¾"; length 18". Complete with side-cut blades. $5.00. No. 114—length 14"—$4.00; 124—24"—6.50; 136—36"—$9.00.

86—HEAVY DUTY DIAGONALS. Built for hard service and long wear. Tremendous cutting power. Length 6"—$2.00; 85—5"—$1.65.

58-R—PROFESSIONAL LINEMAN PLIERS. The most highly developed and most rugged tool of its type. Perfectly aligned double bevel cutters, deeply milled grippers, insulation stripper; easy-riding joint, tapered nose, perfect balance, fashioned handles. Length 8½"—$3.25; 57-R—7"—$2.50; 56-R—6"—$2.00.

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FORGED STEEL PRODUCTS CO., NEWPORT, PA.

Vacuum Grip Pliers — OVER A MILLION IN USE

COMMISSION AND COURT ACTIVITIES

(*Continued from page* 32)

missions, economists and the courts have long since recognized that the market value is immediately determined by the earning power under prevailing rates. . . .

The fixing of values on utility property is complicated further by the fact of government control and the exercise of the power to fix rates and limit the rate of return. The state may reduce rates and restrict earnings but it does not guarantee that the utility shall earn the fair rate of return which it permits. The utility must take the risks incident to competition and economic changes.

If the utility could always earn a fair return on its determined fair value for rate purposes, no more and no less, then the value of the property for taxation purposes should be equal to or the same as its value for rate purposes."

By way of illustration, the court cites the case of a certain intrastate railroad, built at a cost of approximately $6,000,000 which was recently sold for $650,000. Commenting on the case, the court said:

"Clearly this utility is not now worth what it cost or its reproduction cost less depreciation. Other courts have recognized the play of economic forces in determining the market value of a utility as something different from its cost."

CABLE LUBRICANTS

Albany Underground Cable Lubricant adopted by **Bell System** for pulling lead sheathed cable. Write for particulars. Adam Cook's Sons., Inc., Linden, N. J.

POLES

B. J. Carney & Co., 160 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Fentrex Butt Treated or Plain.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finishd Cedar Poles. Plain or butt-treated.

▼ ▼

Monthly Rates Increased; Toll to Exchange Removed

The Jamestown Telephone Corp. has been ordered by the New York Public Service Commission to establish service between its Kennedy central office district and its Jamestown central office district on the basis of rates and charges not exceeding those now charged subscribers in its Bemus Point central office district. The company was directed to file rates comparable with those in the Bemus Point district to apply to the Kennedy district, and subscribers in the Kennedy district are to receive service at rates not exceeding those in the Bemus Point district.

The commission rejected proposed schedules under which the company sought to combine Kennedy and Randolph in one district and eliminate the toll charge between Kennedy and Randolph, but not to include Kennedy in the Jamestown service area as is Bemus Point.

To include Kennedy in the Jamestown service area on the same basis as Bemus Point will result in increases of 25 cents per month for rural line residence service, 50 cents per month for rural business and four-party residence service, 75 cents a month for individual residence and $1.50 per month for four-party business service and $3.00 a month for individual business lines. The change now ordered, although it will increase monthly rates in the Kennedy area, will eliminate the toll charge between Kennedy and Jamestown. This is in accordance with the desires of complainants.

To include Kennedy in the Jamestown area will reduce the company's revenue about $550 a year, but if the 22 non-subscribers who petitioned for the change become subscribers, there will be no change in the revenue.

▼ ▼

Higher Rates Allowed on Some Classes of Service

H. H. Harris, owner of the Martha Telephone Co., Elgin, Okla., was recently granted authority by the Oklahoma Corporation Commission, to place in effect with the next billings higher rates on some classes of telephone service. The new rates compared with the old are:

Individual line business, old $2.00 per month, new $2.50; individual line residence, old $1.25, new $1.50. Other new rates include: Multi-party rural, $1.25 per month; business extension, 75 cents; residence extension, 50 cents. The order provides that where a subscriber owns and maintains station equipment within his premises, he shall receive a credit of 25 cents per month for station equipment so owned and maintained.

The new rates applying to the Elgin exchange conform to rates authorized for Independent telephone companies by the Oklahoma Corporation Commission in October, 1918. The Elgin exchange, however, took advantage only of the rural rate authorized in that order. Therefore, the commission rules, it should be permitted to place in effect other rates authorized in the 1918 order.

▼ ▼

To Investigate Handset Charges Individually

Holding that it was impossible to handle in one general case revision or elimination of handset charges by larger Wisconsin telephone companies, the Wisconsin Public Service Commission on July 15 dismissed the handset investigation it had ordered and announced it would institute separate proceedings for individual companies.

"There would be a wide variation in the effect of a general order respecting charges for handset service," the commission said, "making it difficult for the commission to consider the rate structures of all telephone utilities in one proceeding.

"The commission believes that investigation of handset charges should be made for individual companies rather than in a general proceeding."

Last month the commission began investigating handset charges of eight cents a month by the Wisconsin Telephone Co. with a view to having the charge eliminated.

▼ ▼

Rate Increases Granted Nebraska Company

The Nebraska State Railway Commission has authorized the Hamilton County Farmers Telephone Association to publish and collect for rural and residence service at all of its exchanges a rate of 15 cents per month over the present charge and 25 cents a month additional for business service at all of its exchanges except Aurora, where a 50 per cent increase is granted. The new rates became effective July 1 and are to continue in force for one year thereafter unless otherwise altered by further orders.

The commission finds that the company's present rates are comparatively less than rates charged by other companies at exchanges of similar size and

circumstances. Company reports show that operating losses have been sustained annually since 1932. Due to the loss of many subscribers and the resultant decrease of revenues, the company has had difficulty in maintaining an adequate cash fund with which to conduct its business.

The company was moved to make the application because of $10,000 damage suffered by sleet storms in early April. The commission finds that increased revenues to create additional cash funds are necessary to enable the company to restore its facilities and continue adequate service to subscribers. The company operates exchanges at Aurora, Doniphan, Giltner, Hampton, Hordville, Marquette, Phillips, Stockham and Trumbull.

▼ ▼

Authorized to Issue Telephone Bonds

The Nebraska State Railway Commission has issued authority to the Blair (Neb.) Telephone Co., operated by E. C. Hunt as one of his chain of telephone service corporations in northeastern Nebraska, to issue $25,000 of 4 per cent bonds maturing in 15 years. Back in 1930 the commission authorized the issuance of $30,000 of 5 per cent bonds, and since then the outstanding issue has been reduced to $20,000.

The company has $21,500 of short-term notes that it seeks to have reduced in amount, and Mr. Hunt said that the remainder of the old 5 per cent bond issue would be retired, along with a part of the notes. The bonds have been placed at 95, and the order of the commission requires that the discount of $1450 be amortized out of revenues for the period of maturity. The company operates exchanges at Blair, Kennard and Fort Calhoun.

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Informal Rulings of Wisconsin Commission

Private owners of a telephone company in Wisconsin may form a corporation and transfer their property to it without authorization of the Wisconsin Public Service Commission, a recent ruling by the commission stated.

The ruling was in answer to an inquiry about the Five Points Telephone Co. operating in Akan, Dayton and Richwood towns, Richland county.

In answer to an inquiry from the Daleyville Telephone Co., Mt. Horeb, the commission said a company can levy an assessment of $5 a share to enable the company to continue operations, if the company is a corporation and if its by-laws do not prevent assessments. The requests for rulings did not state what action was being contemplated by either of the two telephone firms.

Summary of Commission Rulings and Hearings

Federal Communications Commission Washington, D. C.

July 15: Applications filed by the Bell Telephone Co. of Pennsylvania requesting authority to supplement existing facilities between Ercildoun, Doe Run and Unionville, Pa.

July 21: The Indiana Bell Telephone Co. authorized to purchase the Dugger (Ind.) Mutual Telephone Co. for $3,000.

Illinois Commerce Commission

September 14: Hearing in Chicago (continued to this date from July 19) on the proposed new system of accounts for Class A and B companies, at which time Samuel Meisels, accountant for the commission, will be cross-examined and the matter argued before the commission.

Kansas Corporation Commission

September 6: Hearing in Topeka on application of the Southwestern Bell Telephone Co. for permission to increase its rates in Kansas City, Kans., to equal those in effect in Kansas City, Mo., and for authority to change the rate for service connections and moving telephones in Kansas City, Kans.

Michigan Public Utilities Commission

July 13: Order issued approving the schedule of rates, rules and regulations filed by the Whittemore Telephone Co.

July 19: Schedule of rates, rules and regulations filed by the Dansville Telephone Co., of Dansville, approved, subject to same conditions and qualifications as contained in order of July 12.

July 19: Order issued approving the schedule of rates, rules and regulations filed by the Sand Creek Telephone Co., Sand Creek.

July 19: Approval granted schedule of rates, rules and regulations filed by the Clayton Telephone Co., subject to the same conditions and qualifications as contained in order T-437 of December 22, 1937.

Missouri Public Service Commission

July 28: Application filed by the Southwestern Bell Telephone Co. for permission to convert its magneto exchange at Raytown to common battery operation and to establish a zone of the Kansas City district exchange there. Request for permission to improve the service came after the company had conducted a survey of telephone needs at the insistence of the Raytown chamber of commerce.

The proposed local flat rate would be $4.50 monthly for business telephones, $2.50 for individual residence service. Subscribers who elected to take Kansas City district exchange service would pay $7 for business telephones and a $5.25 flat rate for residence telephones. The $7 business rate would allow toll free 20 originating calls into Kansas City and an unlimited number of incoming calls.

The company's petition said 76 per cent of the subscribers covered in its survey wanted the new service.

Ohio Public Utilities Commission

July 28: The Ohio Associated Telephone Co., of Marion, authorized to increase rates at seven of its exchanges.

Oklahoma Corporation Commission

August 10: Hearing, continued from July 20, on application of James Thompson of Tulsa, for permission to trade telephone exchanges at Britton and Medford for exchanges of the Southwestern Bell Telephone Co., located at Collinsville and Haskell.

September 20: Continued hearing on complaint of citizens of Beaver alleging inconvenient location of central exchange of the Southwestern Associated Telephone Co. at Beaver, and inadequate facilities for putting in long distance telephone calls, especially after 10 p. m. A revised complaint is to be filed.

Pennsylvania Public Utility Commission

July 27: Dorothy Parker, the poet, complained before the commission that the telephone in her farmhouse out of Uhlertown (P. O. Frenchtown, N. J.), is of little use to her because of gossip among neighbors on her line and asked that the Bell Telephone Co. of Pennsylvania move into the district, now served by the Bucks United Telephone Co.

July 29: Further hearings in the commission's inquiry into the rates and corporate structure of the Bell Telephone Co. of Pennsylvania postponed until September.

Washington Department of Public Service

July 28: Hearing in Seattle on application of the Pacific Telephone & Telegraph Co. for increased rates to cover the occupational tax assessed by the city of Spokane. These taxes in Spokane amounted to $37,386 in 1937, it was stated.

Wisconsin Public Service Commission

July 15: The commission dismissed a general handset rate investigation it had ordered and announced it would institute separate proceedings for individual companies.

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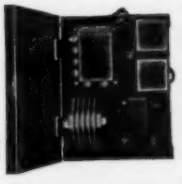
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